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THE
GEOGRAPHICAL REVIEW

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BETWEEN THE TIGRIS AND THE INDUS*

By COLONEL SIR THOMAS H. HOLDICH
Former Surveyor General of India

On the British Indian frontier, some two hundred miles to the west of Peshawur, there is an upland of open rolling plains, intersected and encompassed by rugged mountains, well watered and fertile, enjoying, on the whole, a temperate climate, bright and warm with sunshine in summer and wrapt in the snowy mantle of an Eastern Switzerland in winter. It is, indeed, a Land of Promise. I know nothing more beautiful than the promise of late spring in this land. Then the wide plains are spread with a shimmering sea of upspringing corn, and at the far edges of the plains the lower slopes of the mountains are half veiled in a light-blue haze which faintly reveals white villages clinging to their craggy spurs. Near by, the running streams of bronze irrigation water, bordered by groves of mulberry and scented willow, are often pink with the scattered petals of peach and almond blossom. It is a land of the vine and the olive and the melon, and of a great wealth of later autumn fruits. In winter it is icebound, with much display of the fantastic beauty of ice shapes in waterfall and river fashioned by the frost grip under the shadow of the snow-capped hills which stand round about its outspread capital; but the winter is the winter of Switzerland.

Apart from its academic interest, it is a subject of vital importance to us at the present time to know what lies between the Tigris and the Indian frontier, for events are gradually shaping themselves there which may ultimately affect our own destinies profoundly. We know that for centuries, since the Turk and the Mongol blocked the way to overland commerce between the Far East and the West, commerce has been forced, so to speak, into the sea. There was a time when, across the width of Persia, by at least

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two world-old highroads, the slow caravans passed and repassed, wearing deep ruts where the camels trod, bringing silks and spices and merchandise from Central Asia and India to Syria and the West. Then came the sweeping hordes of the northeast to interpose a barbaric wedge, which practically shut the main gates of the Eastern trade. European ships then began to find their way to India and China, and one by one, as rival competitors for the seaborne trade sprang into existence, success in securing the greater portion of that trade carried them to the foremost position in wealth and power in the Western world. Finally, England secured it, and has practically held it for two centuries, with what results we know. Let it never be forgotten what England owes to her trade with India. It was the very foundation of her greatness as a sea power.

Now, once again, does there appear to be in a not very remote future the chance of a revival of that old world-honored overland trade which existed before the days of Israel, which brought the treasures of the East to the marts of the West. There is abundant evidence before us that this desire of the nations—the acquisition of the highway to the East—is again a powerful force in international politics. Who can very well doubt that the center of conflicting interest in the present war is gradually shifting eastward and trending towards Constantinople (with all it stands for in the Mediterranean, in Egypt, in Asia Minor, Mesopotamia, and ultimately in Persia), as the final issue to be fought to a finish between Germany and Russia? Two notable events have lately been recorded in the progress of Eastern affairs which bear directly on this important question of overland communications—they are signs of the times and portents of the future. The first railway has been opened in Persia. For the first time has the blue-coated agriculturist of northern Persia stared open-mouthed at a locomotive, bearing a huge national emblem, traversing his fields. This is the Russian military line which connects Batum on the Black Sea with Tabriz. The other event is the piercing of the Taurus tunnel by the Germans, which will rapidly bring Constantinople and Bagdad into direct communication by rail and place a rival enterprise on the Mesopotamian field.

From Herat I once traveled eastward through Afghan Turkestan to the plains south of the Oxus on the borders of Badakshan, in the midst of which plains stands the ancient capital of the Greek province of Bactria, now called Balkh. The modern town is founded on deep buried masses of ancient ruins, about which it is difficult to obtain any authentic information locally. Ask any educated Afghan of that part of the world to tell you the tale of Balkh, and he will reply that it is the "mother of all cities," older even than the ancient Nineveh, and that its birth story is lost in those traditional mists which ascribe both Balkh and Nineveh to Nimrod as their founder.

As we are now dealing with a region where geographical disposition of mountain and plain has shaped the destinies of nations from the very

earliest dawn of history, and as the same geographical factors will yet again shape the course of a history as yet unwritten, it may be interesting to refer briefly to their chief characteristics.

The great plateau of Persia, overlooking Mesopotamia across rugged bands of Kurdish mountains on the west, is shut off from the steppes and highlands of the north by a continuous series of mountain systems, which stretch from Armenia to Afghanistan and beyond through the heart of Asia. But this mountain rim is for a great part of it narrow and easily passable, bordered on the Persian side by a continuous edge of grassland, through which runs the much traversed road connecting Teheran with Meshed and Afghanistan. There are important commercial towns along this route, but the value of it is largely discounted by the fact that the nomads of the steppes north of the mountains still carry their raiding enterprises *(alamans)* over the hills and into this grassland. South of the strip of cultivable country lie the great central salt deserts, separating it from the next important route traversing Persia from west to east, which starts from Bagdad, follows the old Median Way to Kermanshah, and then passes by Kirman to the Indian frontier. These are the two great important highways between Mesopotamia and India which are bound, both of them, to become something more than mere geographical features in a not very remote future. To the north of that mountain barrier, and extending eastward and northward farther than we can tell, in the early dawn of history there dwelt scattered clans of a vast Asiatic horde—Scythians and Sarmatians, of whom we have but a shadowy record. We know, however, that about the period of the Israelite captivity they were crossing the Don, already pushing their way westward towards Europe. I have more to say about them presently.

The geographical position of Nineveh also demands a short examination. South and east of Nineveh, hedging in the plains of Mesopotamia, are bands of wild mountain ranges, rank upon rank, forming a revetment to the Persian plateau, which are extended parallel to and facing the Persian Gulf and Arabian Sea to the Indus basin. They are full of uncouth and unconquered highlanders of many clans and various derivation, some of whom retain the names given them in the records of Herodotus, who wrote five centuries before our era and about two and a half centuries after the fall of Samaria. Immediately north of Nineveh, where rise the sources of the Tigris and the Euphrates, are the mountains of Armenia, reaching to the southern shores of the Black Sea. Through these hills eastward and northward lie those difficult routes, once open to Greece and Assyria, which now, in the process of historical evolution, are again open to military movement. The road from the north, dominated by Bitlis, and the road from the east, dominated by Kermanshah, which have both been in Russian hands, converge on Nineveh—or rather on Mosul, which is the modern representative of that ancient capital, and which is the chief center of

Turkish military activity in Mesopotamia. Thus once again does Nineveh assert the importance of her geographical site as one of the gates to Mesopotamia.

To turn now to this high rolling land of which I spoke in the beginning. This is the home of the Ben-i-Israel (i. e. sons of Israel). The capital town, crescent-shaped and hill-protected, is Kabul; and the country about it is the upper Kabul River basin, a part (and perhaps the most important part) of Afghanistan. The name Afghanistan arouses many memories in many of us; one unfailing point of interest in connection with it is its origin. Afghanistan means, of course, no more than the home of the Afghan; but who is the Afghan, and where does he come from? The name has become crystallized now in Indian history and Indian frontier records for nearly two centuries, but it is apparently only as old as the days of the founder of the Durani dynasty, Ahmad Shah, and it is not a name, so far as I know, acknowledged by any one of the extraordinarily mixed nationalities that occupy Afghanistan. There are Turks and Tajiks, Arabs, Persians and Mongols, with Pathans of mixed origin and all of very ancient lineage, and there are the Ben-i-Israel—but no specific Afghan. I know no one from the mountains of Kafiristan to the deserts of Baluchistan who calls himself Afghan. It is, however, just as well that we should have a recognized British official term for all the peoples governed from the Kabul center of administration within the boundaries fixed to the Amir's dominions, and the name Afghan is far too useful to quarrel with.

The Ben-i-Israel belong to (if they do not comprise) those Durani clans who established themselves as the dominant power in Afghanistan after the death of the great Persian ruler and robber, Nadir Shah, in the eighteenth century, and, consequently, the Amir of Afghanistan is their ruler and chief. They spread over a great part of the upper basin of the Kabul River, and are to be found on both sides of the Hindu-Kush as well as in the basin of the Swat River, where they are known as Yusufzais. In the absence of anything approaching to reliable statistics I will not venture to give an estimate of their numbers, but, at a rough guess, I should put them at about one-fourth or one-fifth of the entire population of all that we call Afghanistan.

Certain ethnological and philological facts point to their Israelitic origin. The statement that the captive Israelites were transported from Syria to regions beyond the Euphrates is vague. Nineveh itself is beyond the Euphrates; together with all the valleys of the upper Tigris and Armenia and Lake Van, Erzerum and Bitlis are all beyond the Euphrates so far as Syria is concerned—but Armenia is the country for which there is historical authority for locating them. This, however, is comparatively unimportant if we consider the statement of Josephus that seven centuries and a half later they were still a "great multitude" gathered beyond the Euphrates. So that it is only within the last eighteen centuries that they have become

so scattered and absorbed by other tribes and races as to leave no trace of national existence. But doubtless the true Semitic spirit of the nomad possessed them and, like the Jews, they probably spread in small groups right through Asia. There is every reason to suppose that they did so. Unlike the Jews, they sacrificed their national cohesion to the lost faith of their forefathers, which had weakened long before they left Samaria. The rites and ceremonies of Jewish ritual, which are still so powerful a factor in maintaining the national unity of the Jews, had given place to strange forms of worship with a general tendency towards idolatry, nor was that federation of tribes which formed the Kingdom of Israel free from constant internal strife and disturbance. Thus elements of disintegration were deeply rooted among them.

There appears to be some confusion of thought as to the identity of the Captive Tribes. According to Kitchener (who was a surveyor in Palestine long before he became a war lord) it is impossible to define the former limits of individual tribes, but there is evidence to show that these limits had disappeared altogether in certain cases before the Captivity. For instance, the tribe of Simeon appears to have retained the nomadic instincts of the race and to have become assimilated with cognate tribes such as the adjacent Edomites and Moabites, only retaining certain holdings within the regions occupied by Judah. Simeon, you will remember, occupied the southern extremity of Palestine, south of Jerusalem, and reached down to Bir-es-Saba (or Beersheba), which is now the base for Turkish military activity in the direction of Egypt. The Captive Tribes were, however, described as an "immense multitude" in the first century of our era by Josephus, and they were still "beyond the Euphrates." But as Josephus is the authority for the statement that a million Jews were destroyed with the fall of Jerusalem, and as this is an impossible number, we may perhaps discount the great multitude of the Israelites. There is nothing whatever to show that at this time (about the year A. D. 70, nearly eight hundred years after their captivity) they were anywhere but in the position assigned to them by the early chronicles—i. e. beyond the Euphrates. Still less can we discover evidence that they had migrated in a body to steppe regions beyond the Black Sea and had become incorporated with the Scythian tribes who had then spread into Europe.

A few words about these Scythian nomads may be interesting in view of certain fantastic theories (thoughtlessly accepted by thousands) that they absorbed the Israelites, or that, in some inexplicable manner, the Israelites became Scythians. When the Greeks began to colonize on the north coasts of the Black Sea, about the time that Samaria fell, they encountered these steppe nomads as they gradually extended trade eastwards by a route into Central Asia which crossed the steppes from the Don to the Ural (about Orenburg), and thence carried traffic southwestward to regions between the Jaxartes and the Oxus beyond Lake Aral.

From the Don to the Ural the route mainly traversed the country of a kindred people called Sarmatians, but on the Oxus and between the rivers Scythians again prevailed. Thus they were to be found at intervals in regions extending from the Oxus to the Black Sea, and, indeed, it seems probable that they were still farther west. They appear to have been first mentioned by Hesiod about 800 B. C., and, by the time of the Captivity, 721 B. C., a good deal was known about them, as appears from the writings of Herodotus. They seem to have occupied all Wallachia, and the Dniester was Scythian as far as the Greeks knew it. They were an immense and widespread people, and with them certain European peoples trace an ethnographic connection, based (with some probability) on the similarity of the name Sakai with Saxon, and the known direction and extent of the Scythian irruption into Europe. The Scythian hordes invaded Medea and overran Western Asia about one hundred years after the Captivity, and, after extending their raids into Palestine, they finally destroyed Nineveh. Then, if ever, the Scythians and the Israelites met. But we know that the Scythians retired northward again and that the Israelites were still an immense multitude beyond the Euphrates many centuries after the tragedy of Nineveh's fall. There was no absorption then, and it is inconceivable that it should have occurred after the days of Josephus and the destruction of Jerusalem.

It is, indeed, almost inconceivable that any considerable tribal emigration left the valleys of plenty and of great natural beauty which lie beyond the Euphrates in the uplands of ancient Medea and Armenia to search for a home in the South Russian steppes. The assimilation or absorption of the Israelites by the Scythian tribes may surely be regarded as an ethnographical impossibility. We are confronted with many problems of international assimilation when we deal with national frontiers, but an absorption of one people of strong individuality by another of totally different physical attributes, leaving no trace behind, is practically unknown. I am reminded of the story told about Sydney Smith who, when he was reminded that there will come a time when the lion will lie down with the lamb, replied: "Yes, but with the lamb inside the lion." That, indeed, is descriptive of a process of assimilation which leaves no trace; but no vigorous and virile people have ever been swallowed up in this way. The incomprehensible but immutable laws of heredity prevent it. The impress of physical feature and of character inevitably recurs, sometimes continuously, sometimes after long intervals; but the result is certain, and, indeed, that result is often comparatively independent of numbers and based far more on character. No trace whatever of Semitic (still less of Hebraic) admixture seems to be recognizable among the Saxons of Germany, whose claim to Scythian extraction is difficult to overlook. This is what Hippocrates says of the Scythians or Sakai, of his time: "They have stout, fleshy, flabby bodies, the joints concealed by fat, their countenances somewhat

ruddy. They all looked alike. They lived on boiled flesh, mare's milk, and cheese; they never washed, but enjoyed a narcotic intoxication in combination with a vapor bath . . . . The women daub themselves with paste, which they remove every second day." There is a certain irresistible suggestion of the stout beer-drinking Saxon of modern Germany in this unflattering portrait of a great people, a suggestion which imposes the conviction that Saxon and Scythian are of one original race.

After this more or less academic discussion, we turn again to the historical and geographical conditions, human and physical, of that old time-worn and well-trodden region between the Tigris and the Indus which has seen great empires and dynasties rise and fall and which is now relegated to a position among the nations which admits of no pride of race, no military importance—nothing but economic poverty and administrative incapacity. The rights of the highways through Persia, if not Persia herself, have become the desire of Western nations, and we hear loudly expressed political aspirations for the open "road to the East." What does the East mean? Does it mean Persia and Central Asia, or does it mean Afghanistan, India, and China—or all of them? I think we may take it that it undoubtedly means India directly and the rest ultimately. I have already drawn your attention to the fact that the iron rails of two great systems emerging from Europe now point eastwards, and that neither of the two belongs to England. One is Russian from the Black Sea, the other is German from Berlin and Constantinople.

Let us look at Russia's opportunities first. From Julfa, on the Aras, where the boundary between Russia and Persia is crossed, to Tabriz is only 93 miles; Tabriz being, perhaps, the most important commercial center in Persia, with a great trade in carpets, cotton, dried fruits, etc. Moreover, Tabriz is, or will shortly be, in direct connection with the great agricultural districts round Lake Urumia to the west, and by its connection with Tiflis it becomes an important branch of the whole great Russian railway system. We may be well assured that this important innovation into Persian territory was not undertaken for the sake of bringing carpets and raisins to the Russian market. We may indicate Teheran as the immediate military objective where railway extension will support the long-considered scheme of Russian domination throughout Northern Persia. To Teheran there is about 350 miles of somewhat narrow mountain approach under the shadow of the Elburz ranges; but it is a well-known route, carrying a telegraph line, which encounters no greater obstacle than one comparatively low watershed (I do not know the exact height of it) and a bridge over the Sefid Rud, before reaching the important town of Kasbin, about 100 miles short of Teheran.

From Teheran there opens out at once a magnificent prospect eastward—perhaps the greatest that the Eastern world affords. The military domination of all northern Persia would be incomplete without the support

of a railway skirting on its southern side the great mountain system which reaches from south of the Caspian to the western borders of Afghanistan. We may take it for granted that the necessary line will follow, backed by Russian energy and capital. If it follows the old trade highway to Shahrud, Bujnurd, and Kuchan to Meshed, it will not only tap, and at the same time develop, the resources of a most fruitful district of Persia, but it will set an end to the raiding proclivities of the Turcoman horsemen who still, from time to time, harry the open grasslands south of the mountains. From Meshed (about 550 miles from Teheran) will follow an inevitable 100 miles of mountain line to a junction with the Trans-Caspian system on the north, and the almost equally certain extension to the extreme Russian frontier post near Kushk, 80 miles north of Herat. Whether it will eventually reach the Oxus plains about Balkh and join up with that further branch of the Trans-Caspian system which is expected to link Bokhara with Termez on the Oxus (just north of Balkh) is at present unknown, but there is nothing to prevent it except the susceptibilities of Afghanistan, and in the fulness of time it may be looked upon as an almost certain issue. Equally certain in the long future (perhaps not so very long) is the connection with India. The connection via Herat, easy as it is, has often been discussed and as often dismissed from the category of immediate possibilities on account of the interposition of Afghan territory and the direct opposition of the Amir to railway extensions in his country. It is, however, not necessary that either Russia or we should trouble the Ben-i-Israel in this matter, for there is no insuperable obstacle to a connection via Birjand and Seistan, to the west of the Helmand River, a connection which would open out local commercial prospects which might eventually go far towards justifying the expense of maintenance. This, however, is not the only nor perhaps the best of the splendid opportunities open to Russia for Persian development and connection with India. So far we have dealt only with what will prove to be an essential condition of Russia's domination of northern Persia—i. e. the line from Teheran to Meshed. That will inevitably take the precedence of any more purely commercial enterprise as a necessary strategic condition. And here I may perhaps be permitted to record my opinion that Russia's control of northern Persia will be greatly for the benefit of the country and of the people, who will thus come directly into contact with her methods of civilization. Russia's goods will flood the markets, and Russian traders will compete with Armenians and Persians in these busy marts; but the great gain to northern Persia will be security and peace. Nor need we in the least fear the results of this acquisition of a new frontier to Russia, which has long been her natural heritage from its geographical position. Here it is not the Elburz system—which is readily crossed by the raider—but the vast salt midland deserts which form the best natural southwestern horizon to Russia's Trans-Caucasian provinces. The other obvious opportunity to Russian enterprise is a line

from Teheran southward to Kashan and Ispahan, and thence through the great commercial centers of Yezd and Kirman to Baluchistan and India. Such a line as this would be the making of Persia. Whoever builds this line holds Persia in his hands and must exercise paramount influence on her destinies. It is Persia herself who should construct such a line as this and secure for her revenues the enormous advantage of a great through mail service between Europe and the East.

Just what I have so lightly and so inadequately sketched may indicate Russia's position in that contest for the highways to the East which she is undoubtedly waging at present. Germany's position is perhaps not quite so clear. Absolute dominance in the Balkan States and in Turkey is the basis of it all, and the open line to Bagdad is the inevitable sequel which appears at present to be well within her grasp. But what beyond Bagdad? It is, I think, sufficiently clear that she might have visions of a line passing up the old Median Way to Kermanshah, and thence extending itself along that upland road which I have already pointed out as passing by Yezd to Baluchistan. But I very much doubt if any such ambitious program was ever regarded as a probable, or even possible, result of a Bagdad occupation. She might, again, look to lower Mesopotamia and an extension to Basra, thus securing for herself not merely the upper half but the whole wealth of the rich Mesopotamian plains when Sir William Willcock's great irrigation scheme ripens into an accomplished fact. That, indeed, would eventually amply repay the outlay on the whole project. It would be a magnificent contribution to the Eastern world's development, and it would bring Germany to a seaport at Basra. That, again, does not seem (so far as any indications as yet presented to the public are trustworthy) to be her present ambition. It brings her into direct conflict with Britain. The line to Bagdad in itself would sufficiently tap the broad wheat and cotton areas, and would go far to drain our Basra trade dry without any excursion southward. Moreover, when Germany makes a bid for Eastern commerce you may take it that her ambitions are wholesale and far-reaching. It is not merely Mesopotamia and Persia, or even India added, that fills her horizon. You must also add China, and remember the millions that she has already sunk in securing a footing in that Celestial republic (if it is a republic). That is perhaps why, in days before the war, it was not Basra that figured in German propositions, but the port of Koweit, south of Basra, commanding the seaway to Basra, and untrammeled by a long shallow-river approach with a bar and bottom of mud. That is perhaps why in these days, when any faint suggestion is made of the peace terms that would suit Germany, we always hear that England is to give up control of the sea. What does it mean? The North Sea and the Atlantic have ever been open to German shipping. Many of us have traversed the ocean in Hamburg-Amerika liners and found them comfortable enough. Her ships have been able to come and go as they please. But she has not been able to plant

coaling and, incidentally, submarine stations on any coast she pleased, nor has she obtained a port in Eastern waters between Suez and China. Here, I believe, we have the true explanation of German ambitions as regards Eastern trade—ambitions which would involve a direct threat to Indian traffic if not to India herself (for we must remember that India is far more vulnerable by sea than she is by land). This consummation of her hopes is for us to deal with—not for Russia—and the consideration of it brings us back to a fuller appreciation of the meaning of political domination in the Balkans and Constantinople, and, finally, of that command of the sea which is our heritage, and which is far more to us than any conquests or expansions by land that we are ever likely to contemplate.

We have, however, rather drifted away from the Tigris and the Indus whilst following out this brief consideration of the "road to the East," the command of Eastern trade, which has become the dominant factor in the war. In conclusion, I would suggest that, apart from these war questions, which are necessarily of vital and immediate interest to us, there is ample and most interesting opportunity for inquiry and research into the academic fields of the history and ethnology in the regions which lie between the Tigris and the Indus. There is, I hope, a prospect that opportunity for such investigation is not far distant. We want to know more than we know at present of the Armenians and their records as well as of the Ben-i-Israel; and we want a closer geographical knowledge of all that lies between Herat and Kabul. Above all do we want a scientific examination of the site of the city of Balkh, which would surely yield results of importance and historical interest such as would rival even those of Nineveh.

THE HOMES OF BLINDFISHES

By CARL H. EIGENMANN
Dean of the Graduate School, Indiana University

Blindfishes are found wherever darkness or semi-darkness and isolation, conditions suitable for their existence, have prevailed for a sufficient length of time. They are found in the depths of the ocean, in limestone caverns, and in cracks and burrows of various sorts. Their distribution and characteristics form one of the highly interesting chapters of the science of zoögeography.

Blindfishes' eyes are in various stages of degeneration. In some blindfishes the eye begins to develop in the normal way, but sooner or later it lags behind the other structures in rate of growth and differentiation, and then it stops growing altogether. Some parts of the eyes stop growing sooner than others. Soon after the development of the eye has ceased, it begins to degenerate. The lens stops growing first and is the first part of the eye to begin to degenerate. The example of the lens is followed sooner or later by other portions of the eye, so that in old age there is frequently nothing left in the remotest way resembling an eye.

Most of the localities where blindfishes are found are monotonous in the extreme. The depths of the ocean know no changes from day to night, from season to season, from year to year. Such trifling changes as there are probably are not perceptible during the lifetime of any individual. Even in limestone caverns in the temperate zone, the diurnal changes are practically nil and the seasonal temperature changes are but slight. But there is much difference from place to place in the clarity of the water, the amount of water, and the rate of the current. The fluctuation in the height of the River Styx in Mammoth Cave, Kentucky, is said to amount to sixty feet. The river in Shawnee Cave, Indiana, sometimes fills the cave to the top, and in temperature it ranges from about 45° to 63° F.

Not all fishes living in dark places are blind or have defective eyes. It is safe to say that no fishes that depended on their eyes to secure food, to avoid being food, or to find mates have in the past either colonized caves or gone blind; and it is equally safe to predict that the descendants of the fishes now depending on their eyes will never become blind. The various blindfishes have all been derived from ancestors that could, and probably did, dispense with the use of eyes long before they came to live permanently in dark places.

Knowing the above facts, it is a comparatively simple matter to enumerate the families of fishes in which blind members may have developed or that may in the future give rise to blind members. The existing blindfishes

FIG. 1—Looking straight up from the bottom of one of the cistern-like caves near Cañas, Cuba, to the near-circular entrance of the cave. The tree, *Ficus*, sends several roots to the water in the cave.

FIG. 2—Looking obliquely down into the cave of Fig. 1. Notches have been cut in some of the roots, by which one descends to the bottom. Blindfishes can always be found in this cave.

FIG. 3—Blindfish River, Indiana, in flood. At such times it is not possible to enter the cave.

FIG. 4—Bats on the roof of Marble Cave, Missouri. Bats winter in many of the blindfish caves. The bats enter the cave in late summer and fall—apparently as soon as they are fat enough. They at first congregate in the deeper recesses of the cave. Towards spring, as the accumulated fat disappears, they move toward the entrance of the cave and make frequent trials of the out-of-doors. If conditions are unfavorable, they go but a few yards before they return to the cave. If they are favorable they remain outside. (Photo by C. H. Spurgeon.)

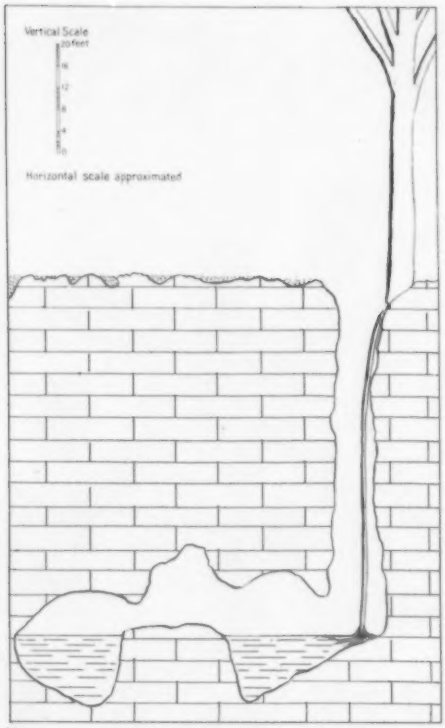

FIG. 5—Explanation on the right.

belong to nocturnal, as distinguished from twilight fishes, and to groups that detect their food and their mates by taste and touch or that live under rocks and in burrows of one sort or another.

I have had experience in catching blindfishes in California, Cuba, and the Mississippi Valley (in Indiana, Kentucky, and Missouri), and I have directed their capture in South America. The blindfishes in these different regions are not related to one another. They are related to epigean, eyed fishes living in the same neighborhood. .

FIG. 5—Cave Tranquilidad, southwest of Cañas, Cuba. Figs. 5 and 6 represent various types of Cuban caves. The masonry effect represents the native rock out of which the caves have been dissolved. The water in these caves is so charged with lime and manganese that a crust of these minerals is formed on the unruffled surface of the water as it evaporates.

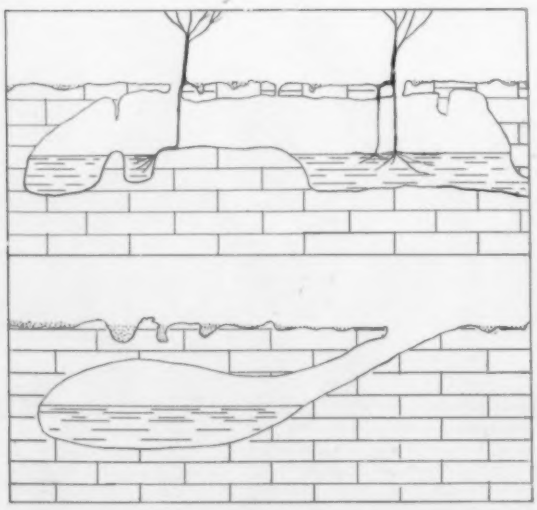

FIG. 6—Explanation on the right.

At San Diego, California, Point Loma sticks its nose into the Pacific. It is composed, among other things, of sandstone, gravel, and water-worn boulders. The waves of the ocean have gnawed off the margin of the point and crumbled up the material at its base. Many of the boulders washed down are half buried in the sand at the

FIG. 6—(Upper) Diagram of a cave near Cañas, Cuba. (Lower) Cave on the Finca San Isidro. For general explanation see Fig. 5.

base of the point. Under the boulders a crawfish-like crustacean has its burrows, and in these burrows lives a blindfish, *Typhlogobius Californiensis* (Steindachner). It is a member of the family *Gobiidae*, which is widely distributed along the shores and brackish water of the warmer seas, and in the fresh water of tropical America. Many of the relatives of the Point Loma blindfish live in the ocean and bay about the point. Several of them live in the burrows of different crustaceans in San Diego Bay.

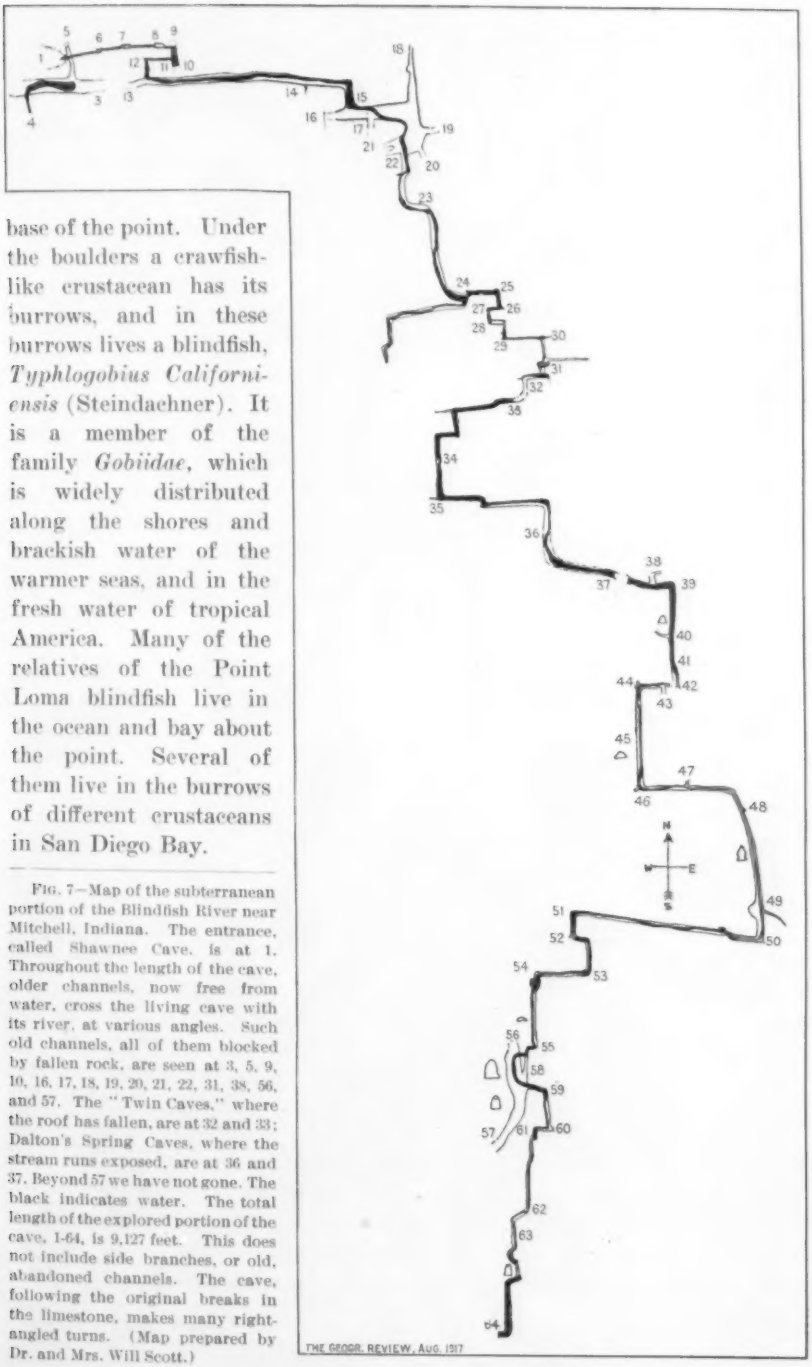

FIG. 7—Map of the subterranean portion of the Blindfish River near Mitchell, Indiana. The entrance, called Shawnee Cave, is at 1. Throughout the length of the cave, older channels, now free from water, cross the living cave with its river, at various angles. Such old channels, all of them blocked by fallen rock, are seen at 3, 5, 9, 10, 16, 17, 18, 19, 20, 21, 22, 31, 38, 56, and 57. The "Twin Caves," where the roof has fallen, are at 32 and 33; Dalton's Spring Caves, where the stream runs exposed, are at 36 and 37. Beyond 57 we have not gone. The black indicates water. The total length of the explored portion of the cave, 1-64, is 9,127 feet. This does not include side branches, or old, abandoned channels. The cave, following the original breaks in the limestone, makes many right-angled turns. (Map prepared by Dr. and Mrs. Will Scott.)

FIG. 7—Explanation on the left.

In various places in the Mississippi Valley there are more or less extensive limestone caverns. They are abundant in Missouri, where streams of larger or smaller dimensions course through them, to emerge again beyond. Such caves exist at Sarcoxie, Roaring River, Springfield, and other places. The caves about Sarcoxie harbor a small blindfish in which the eyes have all but vanished. The caves of Kentucky have long been known to harbor two or three different blindfishes, as well as a close relative not actually blind. In Indiana blindfishes have been found from Wyandotte Cave near the Ohio River to Mitchell. The caves in which blindfishes are found more abundantly than elsewhere in America are east of Mitchell, Indiana. Here large areas are covered with sink holes that drain into underground streams which find their exit in the escarpment along White River, sometimes in gorges and caverns of rare beauty. The largest of the underground streams, which leaves its tube by Shawnee Cave, and which can be reached at four other places where the roof has fallen, runs under a tract of land containing 182 acres. This land escheated to the common-school fund of Indiana. The legislature authorized the trustees of Indiana University to buy the land. It is now under the management of Indiana University and will be preserved as a natural monument for future generations.

All of the blindfishes of the Mississippi Valley belong to one family. There are but seven species of this family known to naturalists, and most of them are found in caves. They are the blindfishes *par excellence*.

One, *Troglichthys rosae*, is confined to the caves of southwestern Missouri; *Amblyopsis spelaeus* is found in Indiana and Kentucky. *Typhlichthys* is also found in Indiana and Kentucky, but the species of Indiana is different from those south of the Ohio. There are apparently two species in Kentucky. All externally visible, ornamental differences, such as distinguish different related epigean species, are absent in the blind cave fishes. They are all pink. The eyed relatives of the blindfishes are *Chologaster papilliferus*, living in a cave spring in southern Illinois; *Chologaster agassizii*, found in the caves and springs of Tennessee and Kentucky; and *Chologaster cornutus*, which lives in the swamps of Georgia, South Carolina, and Virginia. The places in which the different species of these fishes live are, for the most part, separated from each other by effective barriers. The Ohio and Mississippi Rivers are probably as effective barriers to the blindfishes as now developed as so much sand would be.

In Conestoga Creek, a tributary of the Susquehanna in Lancaster County, Pennsylvania, Cope secured some blind catfishes with eyes in a variable transition stage. They are simply a blind representative of the ordinary type of Silurids characteristic of North America.

Much of western Cuba is drained by underground streams. From one of them Havana is supplied with water. The streams sometimes run above ground for a distance, then run below ground and reappear again near the coast or even under the surface of the ocean. In many places both east and

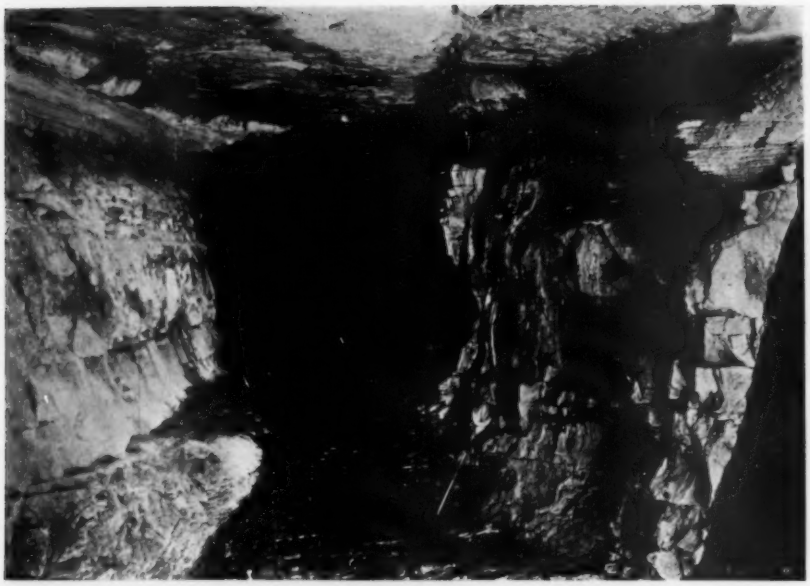

FIG. 8.

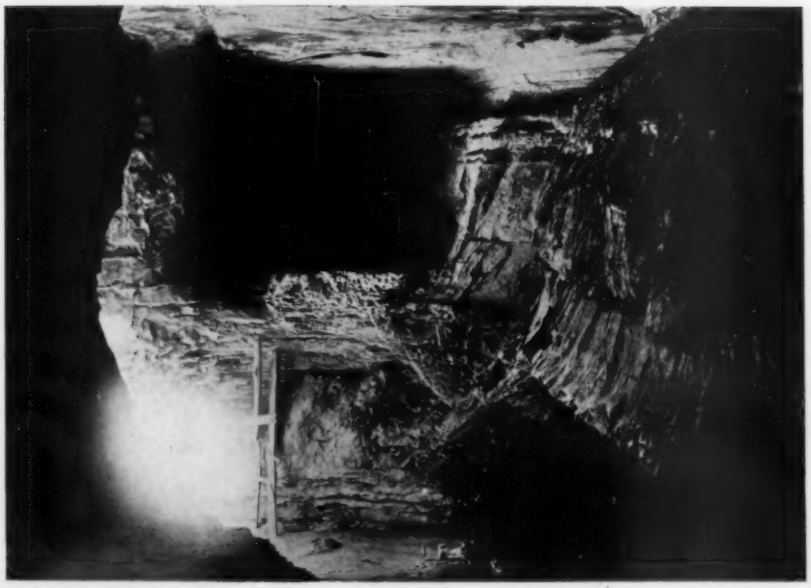

FIG. 9.

FIG. 8—Looking into the south portion of the abandoned dry cave just within the entrance to Shawnee Cave. The abandoned channel has been cut in two by the living cave. During very wet weather a little water still flows out of this channel. For indication of size, note the collecting net on the right wall. (Photo by Drs. F. Payne and N. Miller.)

FIG. 9—Looking north into the continuation of the dry cave, opposite the one shown above. This portion is permanently dry. A few tools once used by Indians were found in this part of the cave. Light entering the cave and reflected from the wall has fogged the spot in the lower left corner. For indication of size, note the collecting bottle on the ground. (Photo by Drs. F. Payne and N. Miller.)

west of Havana there are *cenotes*, or natural wells or caves. The ground may be quite level, when one comes suddenly on a circular opening of greater or less extent. This usually leads into a conical, sometimes irregular cave containing water in which blindfishes are found. Sometimes half of the roof of the cavern has fallen so that one can walk down to the water, but usually one has to climb down. This is often made easy by a tree, *Ficus*, which is found at the mouth of the cave and sends aërial roots through the cave to the water.

In many of the caves of Cuba stalagmites rise from some distance below the water, showing that the water in these caves has risen in recent years, that is, this portion of the island has been lowered. The water is surcharged with lime and magnesium, and, as its surface is not disturbed, a crust of these minerals forms over the water with evaporation.

The blindfishes of Cuba, two in number, *Lucifuga* and *Stygicola*, have their nearest relatives in the surrounding ocean. They belong to the marine family *Brotulidae*, and their relatives are all found in the ocean. *Stygicola dentatus*, the larger of the Cuban blindfishes, is found both east and west of Havana, on both the north and south slope of the island. *Lucifuga subterraneus* is found only on the south slope west of Havana.

In southeastern Brazil, in the province of Santa Catharina, there are caverns containing blind catfishes, *Typhlobagrus Kronei;* the eyes of these are remarkably variable. Some specimens have no eyes at all, others have fairly developed eyes. They seem to be blindfishes in the making. Some of them have not yet arrived. Their relatives, *Pimelodella transitoria*, living outside these caves, are so similar to them that there can be no question about the origin of these blindfishes.

On the island of Marajó, opposite Pará, there is another blindfish. It is so different from the other South American fishes that we cannot say just what the ancestral species and genus were, although it was certainly near *Pygidium*, another of whose relatives is going blind in the plains of Bogotá.

In the streams of the high plateau surrounding Bogotá, "El Capitán del Bogotá" is very abundant. It is a speckled, eel-shaped, but shorter and thicker fish of a genus and species peculiar to the region about Bogotá, *Eremophilus mutisii* (Humboldt). It is provided with a number of barbels and has the habit of burrowing in the banks and bottom of the streams. I have seen many of them with but slight local variations. Recently I secured three specimens. One is without color, and normally colored in spots, and the eyes are normal. The second one is without color except in the normally developed eyes, which are black. The third is without color, and the eyes are also without color and scarcely visible externally. It is a blind fish. The first one has the appearance of a cross between the normal Capitán and one of the bleached blindfishes.

The development of blindfishes has very probably been along normal

orderly lines of evolution and by processes still in operation. The cataclysmic origin, of which the origin by mutation is a modified revival, has been suggested and may not have been altogether excluded in one form or another, but it could only have been effective in a fish otherwise a proper candidate for blindness.

The processes by which the Point Loma blindfish has reached its present estate have been retained in various stages by its relatives. They live in burrows, but habitually lie in the pools about the burrows, descending only to escape danger. One can see them in numbers in the minute pools left at low tide. At the slightest danger they dive into their burrows. The blindfish has gone a step further. It lives permanently in the burrows. This does not mean that it may not occasionally come into open pools, but it could not maintain itself there, it could not avoid its enemies. If any foodstuff comes into contact with it anywhere, it turns flash-like to seize it.

The *Amblyopsis* of the Ohio Valley offers the double problem of its origin and its present distribution, being found both north and south of the Ohio. Its distribution can perhaps best be explained on the assumption that it did not originate at one point but developed all over its present range from its widely distributed ancestors with eyes. The salamander, *Spelerpes maculicauda,* is now becoming a permanent cave animal all over its range, wherever there are caves to be found. The cause and method of the origin of the present condition of the blindfish can best be seen at Horse Cave, Kentucky. At this place an east-and-west valley crosses a north-and-south valley. The north-and-south valley leads to the Green River Valley. The valleys at Horse Cave carry no water. The stream that is responsible for them runs 185 and more feet beneath the town of Horse Cave. The capping of the hills surrounding the valley is sandstone, the lower part limestone. The stream at one time ran above ground, first over sandstone, later over limestone, and drained into Green River. As the largest stream, Green River, lowered its bed more rapidly than the smaller ones, joints in the limestone became exposed, through which at first a small part, then, as the joints became enlarged by solution, more and more of the water of the valley found its way to Green River by subterranean channels. Later all the water ran below ground under normal conditions, and only during freshets did part of it run above ground. The various stages of the process can still be seen in the Lost River region of Indiana.

When the stream ran above ground, it probably had a varied fish fauna. Some of the fishes were pelagic in their habits, others haunted the shores and weeds, still others lived in crevices and under rocks. There may be assumed just such a fauna as is now found in Green River. As the Horse Cave Creek gradually disappeared beneath the ground, the pelagic and littoral fishes went out into Green River, those that were in the habit of finding their food and escaping their enemies in cracks and under stones stayed with the creek in its burrowing, and their modified descendants remain

FIG. 10.

FIG. 11.

FIG. 10—Base of Point Loma, San Diego, California. Under the rocks in the burrows of a crustacean lives the Point Loma blindfish. It is a marine fish with various seeing relatives in the ocean and the Bay of San Diego. The blindfishes attach their eggs to the under side of the rocks. The young develop normal-sized eyes, which later lag behind in their development and degenerate with age.

FIG. 11—Looking across a valley near Horse Cave, Kentucky. The stream now flows nearly two hundred feet underground. Most of the animals which inhabited it when it flowed above ground migrated out to Green River when the stream was "lost." The ancestors of the blindfishes and the blind crawfishes went down with the river. Their modified descendants, the small blindfish and the blind crawfish, still live in this underground river.

FIG. 12.

FIG. 13.

FIG. 12—Portion of the rocky beach near Matanzas, Cuba, farther back from the line of action of the waves. The pits in the surface of the rock have become filled with sand, which supports a scanty vegetation. A well in a rift only a few hundred yards inland from this point and only a few feet higher harbors many freshwater blindfishes.

FIG. 13—Rocky ocean beach within reach of the waves at Carbonera, near Matanzas. About these shores lives *Brotula*, a fish very closely related to the Cuban blindfishes. As similar rocky beaches became elevated and the sea water contained in the crevices was replaced by fresh water, the ancestors of the Cuban blindfishes became acclimated to fresh water.

today as the blindfishes of Kentucky. They grew up with the country, or rather, went down with the river.

The blindfishes of Cuba are similarly the result of the development of the island. Where we find, in any animal, a complex adaptation to a complicated unit of environment, there has probably been a concomitant development of adaptation and environment, as armor and armor-piercing projectiles are concomitant developments.

As stated, the relatives of the Cuban blindfishes do now, and the ancestors of the blindfishes probably did formerly, live in and about the coral reefs of Cuba. At Carbonera, near Matanzas, a crevice or rift can be seen in the coral beach a few feet above sea level. Its bottom is filled with sea water. A short distance inland is another similar rift in a beach at a slightly higher elevation. Its lower part is filled with fresh water and contains many blindfishes! The suggestion naturally offers itself that these fresh-water blindfishes were salt-water fishes living in this rift of the coral beach and that they remained in the rift as it became elevated and its water became gradually fresh. That they have become modified in further adaptation to their fresh-water and cave environment, goes without saying. They have always lived where they live now, but as the armor became modified, the adaptation of the projectile to armor also became modified.

The method of rearing the young is very different in the three blindfishes whose breeding habits we know.

The Point Loma blindfish lays eggs in clusters attached to the lower surface of rocks. They swell up and become elongate club-shaped soon after deposition. The young develop large eyes.

The Ohio Valley *Amblyopsis* has a peculiar adaptation to care for the young. The opening of the oviduct is far forward, and the eggs are deposited in the gill cavity to the number of about seventy. They are carried in the gills until after the young hatch and the yolk is absorbed, when the fish are about a quarter of an inch long. The eye begins to develop in the natural way, but very soon first one and then another part of the eye gives up, stops developing, and sooner or later begins to degenerate, so that in the very old there is nothing left but pigment and a few fragments of cartilage.

The Cuban blindfishes give birth to living young about an inch long. At birth the eyes appear well developed and are movable. They also begin to degenerate with age and growth and nearly reach the vanishing point in old age.

THE TRAVELING DOCTORS OF THE ANDES: THE CALLAHUAYAS OF BOLIVIA[1]

By G. M. WRIGLEY

Anywhere between Bogotá and Buenos Aires you may meet these strange exponents of the healing art; among the thronging crowds at the great fairs and the pleasure seekers of the fiestas; in the hut of the mountain shepherd and with the gaucho of the plains. Traveling first class on a southbound steamship from Guayaquil or tramping on foot the desolate road of the Chilean desert the Callahuaya is equally at home.[2] All the secrets of the Cordillera are his, the hidden springs, the best natural shelters—for he scorns the protection of a roof, the shortest cuts. His peculiar disregard of the trodden way is expressed in a popular Aymará phrase, *lagui tuppu*, the road of the Indian, or "as the crow flies."[3] With the Callahuaya the attire proclaims the man: it is quite distinct from that of Quechua or Aymará in its combination of black breeches, red or red-and-white poncho elaborately patterned, bright scarf round the waist and broad-brimmed sombrero of vicuña wool or finest Guayaquil straw. On the breast is worn the huge cross of virgin silver, distinctive mark of the calling. Adorned maybe with false green gems, it and the crude silver finger rings are of recent Argentine fabrication, contrary to their appearance of antiquity. On the other hand the *Kapacha*, or *Chuzpa* as it is termed if smaller, is of native workmanship. This is the wallet that, slung across the shoulder, carries the stock in trade. It is exquisitely made but from our fastidious point of view is spoiled by the invariable layer of dirt and grease. The contents alone betray their vendor, and often from a distance, for they include aromatic gums, resins, barks, and herbs from the hot forests.[4] But these simples do not constitute the entire outfit. The esoteric art of the Callahuaya extends beyond mere drugs. A necromancer, he carries with him charms to meet the emergencies

[1] The most important material consulted for this article is an unpublished manuscript of the late Adolph F. Bandelier kindly put at the disposal of the Society by Mrs. Fanny Ritter Bandelier. It is a matter of great regret that Mr. Bandelier was unable to complete his promised report on the Callahuayas (see "The Islands of Titicaca and Koati," footnote 123, p. 155), for he is the only scientist who has made any real study of these little-known Indians.

[2] According to Bandelier there are authenticated cases of the Callahuaya traveling to Rome, and it is asserted with some show of probability that they have gone as far as the Holy Land. Vicuña Mackenna reports ("El libro de la Plata," Santiago, 1882) that among the very few travelers on the desert roads of the mining zone before the greatest silver discoveries were "solitary caravans of the Indian physicians of Carabaya, who, walking a thousand leagues in a year, visit our cities of the Maule and the Biobio."

[3] Mrs. M. G Mulhall: Between the Andes and the Amazon, London, 1881, pp. 115, 116. Memoirs of General [William] Miller, Vol. 2, p. 239, London, 1829.

[4] Carlos Bravo: Clasificación de las Plantas Medicinales usadas en la Farmacopea Callahuaya, La Paz, 1889. According to Bandelier this contains errors, and the names of plants are given in Aymará and not in Callahuaya but it is valuable in that the list incorporates plants used, not by the Callahuaya alone but by the inhabitants of Bolivia in general, as household remedies.

A list of items in the Callahuaya pharmacopeia is given by C. B. Cisneros: Geografia Comercial de la America del Sur, Lima, 1897, p. 115.

of every-day affairs in the Andes. There are little carved stone figures representing llamas, sheep, or cattle. Manipulated with appropriate ritual they will ensure prosperity among the flocks. Several of these objects were seen by Boman in the Diaguite region where they are known as *illa*.[5] With red wool also used in the pastoral ceremonial they had been purchased from Callahuayas. Similar forms have been discussed by Uhle, who saw them on sale in the plaza of Sicuani and learned their use from an Indian.[6] He describes little figures of sheep having holes on the back exactly like those of ancient forms. According to his Indian informant the holes were filled with alcohol, coca, and the like sacred substances, and the sacrifice, for such it is, was buried in the pastures. With them the Indian pays Pachamama, the Earth, for the boon of the pasture. The figure is placed in the ground between stones and covered with a stone. Each time the annual sacrifice is renewed the new offering is placed under the old, that is, in closest proximity with Pachamama.

A variety of charms cover the needs of agriculture. Prosperity in general, in popular demand of course, is secured by a common form, the clenched hand frequently engraved on the inside with a circle representing a piece of money. Most of the *mullu*, or "stones of Charasâni," as they are commonly called, are of the white alabaster abundant in Charasani, but some, especially among the human figurines sold in secret, are black—for the working of evil.[7] Among educated people the Callahuaya does not enjoy an altogether admirable reputation, and he is usually reticent when questioned by whites, though even here his astuteness does not fail him. What cynical philosopher has bettered his retort when asked for the secret of woman's love? "It is to have money." His dealings with the natives are typified in an incident witnessed by Bandelier: "On the road from Huata to Achacachi some Callahuayas stopped a party of Indian freighters. They took one of them aside and told him he was sick. The Indian denied it but they finally convinced him that he had a headache. Thereupon the Callahuayas sold him about 40 cents (gold) of ordinary snuff, charging him as much again for the cure. He was relieved indeed of his supposed headache and also of a good part of his hard-earned cash!" Another trick of our charlatan, practiced also by the Aymará medicine man,[8] is related by Ascarrunz.[9] In the course of his travels the Callahuaya prosecutes inquiries for Indians who are ill. If any such is discovered he commences operations. At night he buries a toad or some like repugnant creature

[5] Éric Boman: Antiquités de la région Andine de la République Argentine et du Désert d'Atacama. 2 vols., Paris, 1908; reference in Vol. 1, p. 132. See also Vol. 2, pp. 496, 511.

[6] Max Uhle, *Revista Historica*, Vol. 1, p. 389, Lima.

[7] Bandelier describes the Callahuaya fetishes ("The Islands of Titicaca and Koati," pp. 105, 106). He found it exceedingly difficult to obtain information on the practice of the "black" art and impossible to secure specimens of the fetishes used.

[8] Bandelier, *op. cit.*, p. 120.

[9] Adolfo Ascarrunz: Los Callahuayas. App. II to Rigoberto Parades: Monografía de la Provincia de Muñecas, *Bol. Soc. Geogr. de La Paz*, Vol. 1, 1898, No. 2, pp. 42-51.

near the house of the victim and, presenting himself the succeeding morning as a casual visitor, is solicited to perform a cure. After a duly decorous period of importunity on the part of his dupes he consents and proceeds

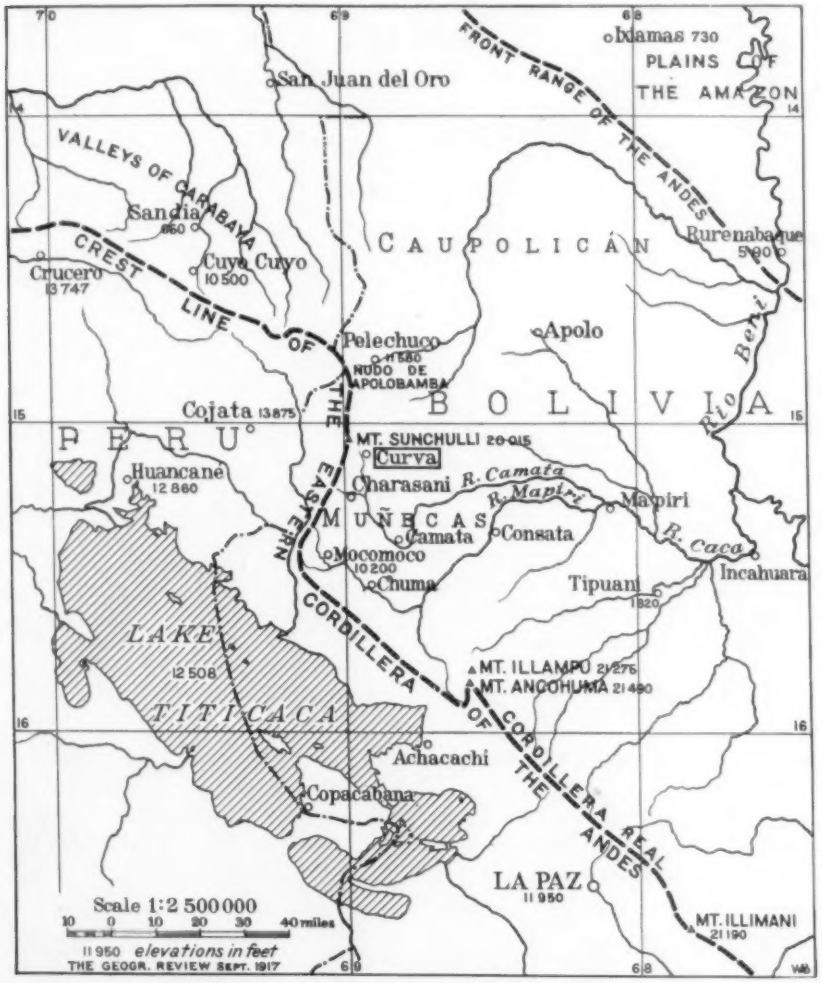

FIG. 1—Map showing location of Curva.

to make a divination, using coca leaves for the purpose in much the same way as a gypsy "throws" the cards. The divination concludes with the unearthing of the toad, whereupon the patient improves and the Callahuaya receives his fee and departs.

One traveler in the Central Andes has summarized the wide range of the

Callahuaya's activities thus:[10] "The *taita* (priest) is venerated as the dispenser of the heavenly blessings, but he is far from enjoying the authority of the Collahuaya [sic], the native oracle. He is newsvendor, peddler, doctor, diviner. He plays a political rôle, announcing the coming of an Inca liberator of the oppressed race[11] . . . in a native village he is arbiter of quarrels and lawsuits, teller of fortunes, purveyor of love-potions, minstrel, story-teller, merchant, veterinary surgeon, receiver of confidences." Even if this portrait is somewhat overdrawn, it is an undoubted fact that the Callahuaya has the entire confidence of the native and not a little of the respect of the more ignorant white.

Whence comes he, this strange exploiter of his fellows? The names by which his tribe is known in various parts of the continent give approximate ideas of his home. "Chirihuana,"[12] as he is called on the Peruvian coast, places him beyond the Eastern Cordillera, though too far south;[13] "Yungeño," as he figures on the pampas of Buenos Aires, is nearer, for it suggests the eastern valleys of the department of La Paz. The "Colla"[14] or "Coya" adopted in northern Argentina connects him with the Titicaca basin. Actually he comes from the border between these two great regional divisions, the *altiplano* and the eastern valleys. Charasani, Consata, Curva, and other villages of the provinces of Muñecas and Larecaja, department of La Paz, have been stated as specific habitations. Modesto Basadre,[15] who gives a short but pertinent account of the tribe, refers only to Curva, and Bandelier emphatically states it to be the sole residence of the Callahuayas.

Among the towns of Muñecas, Curva occupies a unique position. This may be realized by a glance at the topographic and climatic divisions of the province. The range is great; most of the varied regions of Bolivia are here represented. From a narrow strip of the high tableland on the southwest rises the snowy Cordillera of the Eastern Andes. Its summits in Muñecas reach heights of 19,000 feet and more;[16] they are imposing though not quite as superb as the line of "royal peaks" of the true Cordillera Real, carved out of the granite axis of the Cordillera from Illampu to Illimani. The limit of perpetual snow is about 16,000 feet; below, to elevations of 12,000 or 11,000 feet, is *puna* country, whose human importance is confined almost solely to the pastures, except where mineral wealth has proved an attraction. On the graded mature slopes on the southwestern border of the Cordillera is one of the most famous pastoral districts of the

[10] Baron Meyendorff: L'Empire du Soleil: Pérou et Bolivie. Paris, 1909.

[11] Andrews ("Travels in South America." London, 1827) conceived this idea also. There is no authority for it, yet in view of the maintenance of the old Peruvian traditions and customs it is quite conceivable. A species of play representing the "Death of the Inca" is still performed.

[12] William Bollaert: Antiquarian, Ethnological and Other Researches in New Granada, Equador, Peru and Chile. London, 1860. p. 250.

[13] Vicente Pazos: Letters on the United Provinces of South America, 1819. p. 79.

[14] Ludwig Brackebusch: Viaje á la Provincia de Jujuy, Buenos Aires, 1883 (?), p. 26.

[15] "Riquezas Peruanas escrito para 'La Tribune.'" Lima, 1884.

[16] The height of Sunchulli is given as 20,015 feet (Censo Nacional de 1900).

FIG. 2—The Callahuaya: the Traveling Doctor of the Andes. The woven bag (see Fig. 6) and the large silver cross are distinctive of his calling.

Andes. The high, cold pastures of the region around the meeting point of the Bolivian provinces of Muñecas and Caupolicán and the Peruvian province of Carabaya, that is around the knot of Apolobamba, afford optimum conditions for alpaca raising. The wool has long been an important export from the region, a circumstance that stimulated the growth of this section when the boundary dispute was settled by the rectification treaty of 1909. A larger area in Muñecas is occupied by the eastern slopes of the Cordillera. Here, under the heavy rains of the trades, dissection has proceeded far; deep-cut ravines penetrate into the heart of the Cordillera. Profiles are ungraded; rapid descents give great climatic changes within short distances. In the altitudinal and climatic zone designated *cabecera de valle* (head of the valley), about 10,000 feet, maize and wheat cultivation is dominant. Farther down, in *medio valle*, about 8,000 feet, subtropical fruits are at their best and coffee begins to be cultivated, while still farther below, in *los valles*, commence the *yungas*, 5,000-6,000 feet, with coca plantations set in the midst of the extraordinarily rich and varied tropical vegetation of the lower *montaña*.

The relationship between the people and the resources of these zones of the Eastern Cordillera is identical over a large area extending north and south of Muñecas. One of the best descriptions of it is found in Markham's "Travels in Peru and India." Written over fifty years ago it applies perfectly to the region today, and for purposes of comparison it will be advantageous to recall here the statements in regard to distribution. They relate particularly to Carabaya, the Peruvian border province contiguous with Muñecas and Caupolicán.

The ultimate wealth of Carabaya, "the golden," lies in the produce of the hot valleys—the cacao, coffee, coca, and rubber—as well as the deposits of metallic gold that bestowed the epithet upon the province. But the present inhabitants reside almost entirely in villages in the upper parts of the valleys in the *cabecera de valle* or the higher part of the *medio valle*, that is particularly in the maize and wheat zone more or less accessible to the pasture lands of the spur tops—many of these upper valley dwellers owning in addition coca patches in the lower reaches. The villages so situated, of which Cuyo-cuyo, 10,500 feet in elevation, is a good example, have practically no intercourse with one another: each little community is shut off from its neighbors by the wild Andine spurs, or precipitous valley walls. Communication indeed is only possible by pursuing the valley road to the head, crossing the Cordillera onto the plateau, and thence recrossing by the pass proper to the valley sought. From this circumstance has arisen the fact that Crucero, on the plateau and remote from the geographical center of population, has been created capital of the province. Its central location in regard to the passes and trans-Cordilleran routes compensates for its bleak *puna* climate and barren resources.

The geographical relationships for the country south of Muñecas have

been discussed by Evans in his "Expedition to Caupolican Bolivia,"[17] and his journey down the famous Tipuani valley may well be compared with that of Weddell.[18]

In Muñecas[19] the centers of population are in the upper valleys; as Parades expresses it, "each one in the *quebrada* proper to it." It is noteworthy that Muñecas (old province) is one of the five most densely populated provinces of Bolivia, its density at the 1900 census being 30 per square mile (11.36 per sq. km.). Its nine urban centers account for 7,373 people, something over one-fifth of the total population. Of them eight are in the valleys. Mocomoco, with 1,477 people, is in the maize zone at 10,200 feet: Charasani, 787 people, and Italaque, 785 people, are also in the *cabecera de valle;* Chuma is reported to possess a "sauve and serene" climate, the best of the province; it has a population of 1,419. Ayata, a great producer of maize, numbers 1,216 urban population. It includes some of the largest, most valuable and most productive *fincas* of the province: its rural population is 4,524. Camata, on the border of the *yungas,* is hot and its population, 277, is the lowest. Of the nine cantons only Curva is on the *puna.*

The situation of Curva is described by Bandelier as peculiar and picturesque. "It lies at a considerable altitude on a bleak saddle at the base of the imposing Nevada de Accamani. On two sides the slopes go down to appalling depths, narrow and full of precipices with the exception of one only which leads from Charasani to Pelechuco." The town, clustered round the small, wretchedly kept plaza, has the usual dismal aspect of a *puna* settlement. Of its total population of 323 only 10 are white, the remainder being Callahuayas. Why do they reside here? What are the advantages of the *puna* location?

Pelechuco, with an altitude above the average and "occupying a sombre, mist-filled valley," is the outlet for the greater part of the trade of Caupolican Bolivia. Crucero, the bleak capital of Caravaya, is likewise a commercial center. Curva has no commercial movement of this sort. A limited agriculture, potatoes and barley, is practicable, but it is subordinated to the care of the flocks. Gold washing is carried on in a desultory way at the foot of Sunchulli, but the prosperity of Curva, whose inhabitants are the richest of the province, is not dependent on these industries. They are chiefly the work of the women; the men, the wealth-gainers, are employed in the curious itinerant profession that has made them famous throughout

[17] *Geogr. Journ.*, Vol. 22, 1903, pp. 601-646.

[18] H. A. Weddell: Voyage dans le nord de la Bolivie, Paris, 1853.

[19] By a law of 1908 the Bolivian government created a new province, Camacho, from portions of Muñecas and Omasuyos. Apparently the new province includes a part of the eastern slope of the Cordillera as well as the western slope in Muñecas and its continuation in Omasuyos to the shore of Lake Titicaca. It comprehends the old cantons of Mocomoco, Italaque, and Ambaná, formerly belonging to Muñecas. As the distribution of population within them is not unlike that of other districts of the province, the old political division has here been considered for distributional purposes. See *Bol. Direcc. Gen. de Estadistica y Estudios Geogr., No. 89,* La Paz, 1914, pp. 218, 219.

FIG. 3.

FIG. 4.

FIG. 3—Curva occupies the notch in the crest of the spur on the right. In the background are the snows of the Eastern Cordillera of the Andes; the foreground slopes are terraced barley and potato fields.

FIG. 4—Curva lies in the notch at the top of the mountain in the center of photograph. It is not surprising that the natives of this wild and isolated region make their long journeys with so little regard of the trodden road and the ordinary conveniences of the traveler.

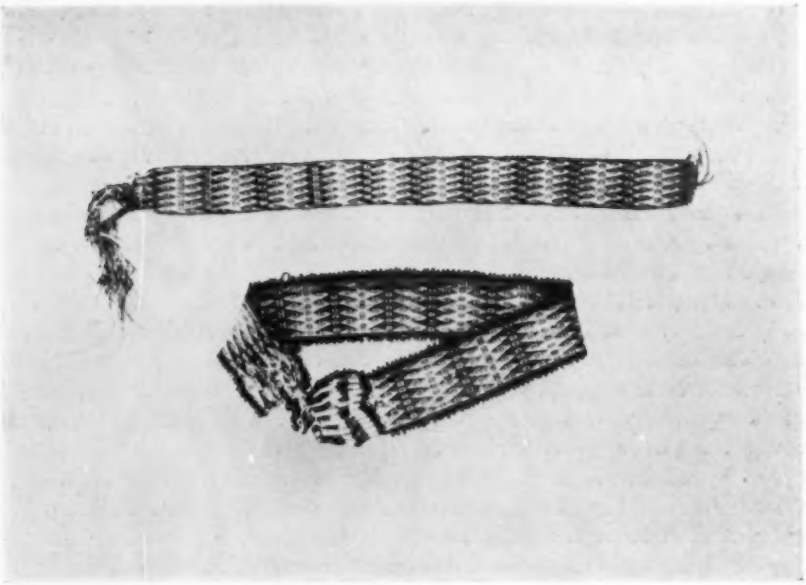

FIG. 5.

FIG. 6.

FIG. 5—Callahuaya head bands. The unfinished band shows the loose threads which will be worked into the tassels worn dangling over the ear.

FIG. 6—The beautifully woven bag in which are carried the drugs and charms that constitute the stock-in-trade of the Callahuaya.

the continent. It has already been described from the outside: it may now be examined in closer relation to the home environment.

The journeys vary in length from a year to three or four or even five years. They are never undertaken by single individuals but always by companies, at times of as many as eight or ten persons. The women sometimes accompany their husbands on the road to Charasani or go as far as that to meet them on their return; otherwise they remain at home. According to Parades, strict measures are taken by the husbands to ensure the fidelity of their wives, though others say that on his departure the Callahuaya hands over his wife to a friend and on his return adopts any children born during his absence.[20] Under the peculiar circumstances of their life such a moral code is not improbable; it would be comparable with that obtaining among the people of the Puna de Atacama, where her illegitimate children are the accepted *dot* of the bride.[21] On his travels the Callahuaya has a reputation for unusual sobriety, though he is reported to engage in drunken orgies on his return home. Likewise remarkable is his "lively and open disposition," as one traveler puts it,[22] in contrast with the customary reserve and stolidity of the plateau Indian. Regarding the religious practices of the Callahuayas there is conflicting evidence, but Bandelier asserts that they always have a solemn mass said before leaving on their journeys and they promise rich gifts for the church in the event of their safe return. Such promises are faithfully kept, and Bandelier himself saw handsome church vestments which had been brought home by them. The journey is prefaced by a trip to the *montaña* for outfitting the wallets. As this trip takes them into the hot country they wear little clothing for it, a circumstance which has led some travelers to suppose the forest their actual home.[23]

The returning Callahuaya brings with him money, horses, mules, and an infinite variety of merchandise, much of which is sold in the adjacent hamlets of Inga, Chajaya, and Kanglaya. These small villages appear to be veritable emporiums. Bandelier was told that anything might be purchased there, from a tasteful bonnet and elegant shoes to a sewing machine and a harmonium!

Such is practically the extent of our knowledge of the life and customs of this strange little human group. How can its peculiarities be explained? Whence originated this form of nomadism? The Callahuaya has been called the "gypsy of the red race";[24] but the term is not really appropriate, for he

[20] Hugo Reck: Geographie und Statistik der Republik Bolivia, *Petermanns Mitt.*, 1865, pp. 257-261, 281-295, 1866, pp. 299-305, 373-381, and 1867, pp. 243-251, 317-329; reference on p. 377 (vol. for 1866). Reck also refers to the Callahuayas' custom of taming mules they bring from Argentina by stopping the beasts' ears with wool.

[21] Isaiah Bowman: Results of an Expedition to the Central Andes, *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, p. 172.

[22] S. S. Hill: Travels in Peru and Mexico, London, 1860, Vol. 2, p. 12.

[23] J. J. von Tschudi makes a statement to this effect. He describes their use of the juice of the *huito* as a protection against insect stings. See his "Travels in Peru During the Years 1838-1842," New York, 1849.

[24] The Callahuaya has also been compared to the "early traveling physicians of Greece." Professor Walter Woodburn Hyde, however, is of the opinion that there never were "traveling physicians," either in early times or late, and that the notion arose from a mistaken rendering of the word "peripatetic."

has a fixed habitation. Rather does the movement at first sight suggest a feature characteristic of mountains wherein the mountaineer makes periodic excursions to the lower country to supplement the scant resources of his native land, as for example the annual excursions of the Italian glaziers of the Piedmont to pursue their calling in itinerant fashion along the roads of France.[25] For such a movement there is a very distinct economic justification, but it is unusual in the Andes, where the Indian is remarkably "fixed." The shepherd may cover an immense area in the pasturing of his flocks, but he is none the less bound to his stone hut and potato patch; the agriculturist may, as in the valleys of Carabaya, possess lands in the hot valley a considerable distance from his home, but he has no tendency to move farther afield. In some instances, and oftener now than formerly, the Indian will voluntarily seek service in the *haciendas* of the white cultivators or even in the mines, but this is not general. This long-established fixity of the Indian is a fact of deep significance. On that foundation was built the ancient Andean civilization. Under the given physical circumstances it is difficult to conceive of so highly perfected an agricultural régime being achieved by any other means.[26]

The elaborate schemes of terracing and irrigation in the steep-walled valleys involved great and constant labor and concerted and directed action. Government was naturally some form of autocracy; individual liberty was necessarily sacrificed to the common good, as is clearly shown by the laws of the Incas. Any man who tried to change his apportioned work in the province to which he was native "committed a very great crime against the Inca, against his nation, and against his native province; and so he was condemned by all and punished with severity."[27] No man could change his residence without license, and the *mitimaes*, the involuntary colonists, who were the individuals most likely to disobey this rule, were most severely punished for any attempt to leave the land of their exile. In the pastoral industry also a rigorous régime was enforced. Careful demarcation of the pasture grounds as well as antiquity of domestication is revealed in the remarkable diversity of color among the native flocks. In accord with this social system the work of subordinate occupations was also apportioned; "different provinces of the country furnished persons peculiarly suited to different employments, which . . . . usually descended from father to son."[28] Higher in the social scale the "professions," science, war, administration, fell into the same scheme. It is in this traditional character of industry under the Inca Empire that we may find the clue to that of the Callahuaya.

Some idea of the status of ancient Peruvian medicine may be gathered from the pages of the early chronicles. In them, so far as is known, the

[25] Reclus suggests this in regard to the Callahuayas, in "L'Homme et la terre," Vol. 1, p. 71. 1905.

[26] The fundamental place of agriculture in the old Peruvian civilization has been emphasized by nearly all writers on the theme. For one of the latest expositions see "Staircase Farms of the Ancients," by O. F. Cook, *Natl. Geogr. Mag.*, Vol. 29, 1916, pp. 474-534.

[27] P. B. Cobo: Historia del Nuevo Mundo, Vol. 3, Seville, 1892, p. 240.

[28] W. H. Prescott: The Conquest of Peru, 2 vols., New York, 1847; reference in Vol. 1, p. 55.

Callahuayas are not referred to by name, but there are various references to exponents of the medical art in general. Acosta says that in the times of the "Kings Incas of Cusco" there were persons "expert in the curing of diseases with simples"; and they had knowledge of the many "virtues and properties of herbs, roots, woods, and plants."[29] Garcilaso also states that herbalists were famous in the times of the Incas ("they knew the use of many herbs and taught their knowledge to their children"), and further quotes a dictum of the wise Inca Pachacutec from the chronicles of Father Blas Valera: "The physician herbalist that is ignorant of the virtues of herbs, or who, knowing the use of some, has not attained a knowledge of all, understands little or nothing. He ought to work until he knows all, as well the useful as the injurious plants, in order to deserve the name he pretends to."[30] Cobo says the natives had very little medical knowledge: they were most expert in the healing of wounds by use of "extraordinary herbs of very great virtue." In their cures sorcery and witchcraft invariably played a part.[31]

The relation of the Callahuaya to the other tribes of the Empire remains to be shown. According to Bandelier he is a Quechua-speaking Indian, and the peculiar unstudied language, also spoken by the Callahuaya of today, is probably no more than a dialect with an added jargon of words appropriate to his mysterious calling. It is used only by the Callahuayas among themselves; outsiders are not supposed to hear it. At Pelechuco Bandelier learned the first ten numerals of the so-called Callahuaya language. They are: *mayti* (one), *payti* (two), *iriti* (three), *yumqui* (four), *taquili* (five), *tacsu* (six), *chianan* (seven), *richaj* (eight), *chipana* (nine), *kolke* (ten). The numbers one and two are clearly derived from the Aymará *maya* and *paya*.

Among the Callahuayas local tradition has it that they were transported as *mitimaes* from the village of Carabaya (or Callavaya or Collahuaya as the name commonly appears in the earlier spelling).[32] According to Garcilaso de la Vega the Inca Sinchi Roca conquered as far as the river called Collahuaya, and under Ccapac Yupanqui the kingdom stretched to Callahuaya, 40 leagues from Cuzco. Certain it is that the Incas made conquests into the coca- and gold-producing lands of the *montaña*.

Here the precise location of Curva becomes significant. It is at the head of one of the Camata valleys, and Camata was one of the gateways into the *montaña*. Today the remains of an Inca road can be traced along the valley far down toward the Amazonian plains. At Incahuara on the Rio Caca, to

[29] Joseph de Acosta: Natural and Moral History of the Indies, Vol. 1, *Hakluyt Soc. Publs.*, 1st Ser., No. 60, 1880; reference in Bk 4, Ch. 29.

[30] Garcilaso de la Vega: Royal Commentaries of the Yncas, Vol. 1, *Hakluyt Soc. Publs.*, 1st Ser., No. 41, 1869, Bk. 2, Ch. 24; *Ibid.*, Vol. 2, 1st Ser., No. 45, 1871, Bk. 6, Ch. 36.

[31] P. B. Cobo, *op. cit.*, Vol. 4, Ch. 10.

[32] Adolfo Ascarrunz (*op. cit.*, p. 42) derives the folk-name Callahuaya from two Aymará words—*calla*, a carrying, and *guayu*, a bundle of clothing, referring to the bundles they carry in their knapsacks. The place connection, however, makes this seem unnecessary.

which the Camata is tributary and which itself unites with the Beni, there are sun and moon carvings on the rocks. Early in colonial times there were four recognized routes for the penetration of a vast stretch of *montaña*. These were (1) by Opatari and the Andes of Tono in latitude 13°; (2) by San Juan del Oro, down one of the valleys of Caravaya; (3) by Camata; and (4) by Cochabamba, latitude 17° 30′. These four entrances are repeatedly mentioned in the documents relating to Juan Alvarez Maldonado, one of the first Spaniards definitely to undertake the conquest of this portion of the *montaña*. His rival, Gomez Tordoya, selecting the route through Camata to forestall the authorized "conqueror," was pursued by the law as far as Charasani. The Jesuit missioners also made early entry to the "Chunchos" via Camata. Camata and Pelechuco are described as frontiers of the civilized Christian Indians against the savage Chunchos. Camata town itself was long on the actual frontier. Its ancient houses were built of stone and constructed in a manner suitable for defence to resist invasions of the town by the Lecos of the Mapiri.[33] Now it is this old-debated territory of the *montaña* that furnishes the valuable medicinal plants.[34] A people situated near the border country with relatively easy access to sources of supply would naturally be selected to act as purveyors of the medicinal plants of the *montaña*. The ancient origin of the profession of the Callahuayas of Curva is at least plausible.

The event of the Spanish conquest would motive no change in a group so small and comparatively remote. Though it broke down the elaborate social fabric, it left the great body of Indians fundamentally unchanged in attitude. Furthermore the Spaniards of the early colonial days were a superstitious people of a superstitious age, and scientific knowledge was scant among them. In 1637 the proposal to found chairs of medicine in the University of Lima was opposed on the ground that "in this kingdom there are many medicinal herbs, for a great variety of diseases and hurts with which the Indians are better acquainted than the physicians . . . . ; many persons, when given over by the faculty, set out for Cercado and Surco [near Lima] to be cured by Indian men and women." Even in the nineteenth century General Miller wrote: "In all the provinces of the department of Puno not one regular medical man is known to exist. The aboriginal tribe of Callahuayas or Yungeños are the only practitioners throughout a great part of South America."[35] It is in the light of a survival that the Callahuaya has the greatest claim on our interest today. He reminds us of the strength of the old geographical controls that rule in the Central Andes. He is entirely in harmony with the unchanged life of the highland shepherd,

[33] Rigoberto Parades, *op. cit.* in footnote 9.

[34] To the Indian inhabitants is commonly attributed an extensive empirical knowledge of their properties. Wierner speaks of the Piros of the Urubamba valley who annually ascend to Hillipani to exchange woven goods, pottery, live birds, and certain medicinal plants of which these "Chunchos" have more knowledge than the Quechua Indian.

[35] *Op. cit.* in footnote 3.

still offering his sacrifices to Pachamama and indifferently mingling prayers to the saints with prayers to the Earth-Mother.[36] He is in sympathy with an agriculture whose products are almost wholly for local consumption, as is the case with all but the largest *haciendas* of the eastern valleys, the major basins of the plateau, and the accessible coast valleys.[37] He is a part of that system of exchange still carried on largely by weekly or yearly fairs because regular means of transportation are so little developed. The fairs indeed contribute largely to the Callahuaya's custom; at them among the ordinary types of mountebank he figures as "an unconfoundable type."[38]

[36] For example: "Mamita Santa Ana, tejer, hilar, Madre de las hilanderas y de las tejedoras: Que sea con tus manos, Pachamama." (Éric Boman: Antiquités de la Région Andine, Vol. 2, p. 490.)

[37] Isaiah Bowman: The Andes of Southern Peru, New York, 1916, Chs. 6, 7.

[38] Ciro Bayo: El Peregrino en Indias, 1911, p. 32.

ISLAND NANTUCKET

By C. F. BROOKS
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For three hundred years, or perhaps longer, Nantucket peoples have lived isolated from the mainland. While protective, this isolation, when extreme, has impoverished the inhabitants; but it has been helpful as long as there was an easy exchange of commodities and ideas with "off-islanders." The limitations of small area and infertility have always strengthened these continental ties.

The Indians, as is shown by their primitive retardation, apparently had little contact with the mainland. "The Indians of Nantucket were a people who were destitute of most of the arts of life. They were acquainted with roasting, but not with boiling. Though they had all the materials on the shore, yet they could not, like the Narragansets, coin wompomeag. They cultivated no plants, except maise, beans, squashes, and tobacco. To each family was assigned a portion of land, equal to about a quarter of an acre, which they broke up as well as they could with the rude tools that they possessed, called in their language *mattoks*, assisting each other in a very friendly manner. They could now and then kill a bird; and there were a few deer: goat skins, but not the animal itself, were found by the English on the island. Fish could be obtained in the harbors and on the coast; and shellfish were abundant (berries too). During the winter, however, they frequently suffered the extremities of famine. Their clothes were sometimes skins, but for the most part coarse mats, made of grass."[1] Obed Macy in his valuable book, "The History of Nantucket,"[2] says: "The natives fished with a rude line of twisted grass, to which they attached a large stone (two or three pounds) for a sinker and a clumsy hook of bone." They killed whales, also, engaging the whale with a harpoon attached to a long bark rope and dispatching him with arrows.[3] Thus the Indians were able to respond to the stimulation of their ocean environment.

Their life was set on and about a low, mostly sandy island of 45 square miles with shore lines smoothed and points projected by the cutting and building action of waves and currents. Nantucket is some 28 miles south of Cape Cod and is surrounded by a large area of shoals, many of which are of sand washed from the island (map, Fig. 1). Climatically, Nantucket is more continental than marine: in winter the prevailing northwest winds

[1] *Massachusetts Hist. Soc., Colls.*, 2nd Ser., Vol. 3, 1815, p. 35.
[2] Boston, 300 pp., 1835.
[3] R. A. Douglas-Lithgow: Nantucket: A History, 389 pp., New York, 1914: reference on p. 47.

come from a cold continent, but in summer the southerly winds pass a long distance over the mild ocean. Winds from the northeast at any time of the year carry the suggestion of the cold Labrador Current. In winter, an intense cyclone sweeping up the coast brings its gales and at times a smothering snowstorm; in late summer and autumn a West Indian hurricane with its tremendous winds and waves may blow and wash away some of the island.[4]

Such were the surroundings to which the first civilized settlers came in 1659. Here for a century was the bustling home port of American pioneer whalemen. And now here is the quiet summer resort of thousands of New Englanders. The nine original share-holders bought the right to the island and gradually paid the Indians for their land. The Indians, always friendly, were indispensable in helping the newcomers build their houses, clear the land, raise the crops, fish, and finally carry on whaling. With the introduction of sheep, for which the island is eminently fitted, the colonists had a great advantage over the Indians' mode of life. The mutton, wool, perhaps some fish, and sometimes even grain enabled them to trade with the people on the mainland. To enlarge and complete the new colony the original purchasers took partners and offered half-shares (54ths) in the island to artisans and trades-people.[5] The white man was able to teach the Indian how to make more effective use of his resources, but he more than offset this by introducing habits and diseases which finally exterminated the primitive hunter and fisher.

The many whales within sight of the island inevitably attracted attention. While the land was poor, the sea was extraordinarily rich. Shore, and then pelagic, whaling broadened the environment of the inhabitants till a Nantucket population was supported three times as great as the present (see Fig. 2). Crèvecœur, in his description of pre-Revolutionary Nantucket, calls it, "a barren sandbank, fertilized with whale oil only."[6] Two thousand men were getting the whales, while the rest were making boats and outfitting

[4] Much interesting information about the changes of the shore lines is given by F. P. Gulliver: Nantucket Shorelines, *Bull. Geol. Soc. of America*, Vol. 15, 1904, pp. 507-522. A comparison of Nantucket outlines as shown on a progressive series of U. S. Coast and Geodetic Survey charts and on the following maps is also instructive:

Island of Nantucket, 1:220,000, drawn by William Coffin for Macy's "History of Nantucket."

Map of Nantucket, 1:127,000, surveyed and drawn by F. C. Ewer. 1869.

Nantucket quadrangle and Muskegit sheet, 1:62,500, surveyed by the U. S. Geol. Survey and the State of Massachusetts, U. S. Geol. Survey. 1887.

Nantucket County, Massachusetts, 1:95,000, surveyed and drawn by J. H. Robinson. Accompanies J. H. Robinson's "Guide to Nantucket." 40 pp., 2nd edit., 1910.

Nantucket and the Surrounding Shoals, 1:250,000. Accompanies A. H. Gardner's "Wrecks about Nantucket, 1664-1915," 149 pp., Nantucket, 2nd edit., 1915. Based on U. S. Coast and Geodetic Chart No. 111, 1915. Nantucket Sound, 1:80,000.

[5] One joiner, miller and interpreter; one shoemaker; one shoemaker and blacksmith; one tailor; one weaver; five seamen.

From H. B. Worth: Nantucket Lands and Landowners," Vol. 2, 216 pp., Nantucket Historical Assoc., Nantucket, 1901-1904. A source-book of Nantucket history containing extensive quotations from town, and other records.

[6] M. G. St. Jean de Crèvecœur; Letters from an American Farmer, 355 pp., London, 1782, reprinted, New York, 1904. Pp. 119-221 in the reprint relate to Nantucket; reference on p. 179.

them, making spermaceti candles, and supplying the people with food, fuel, and manufactured goods.[7]

"The Story of Old [and new] Nantucket" has been told so well by William F. Macy[8] and others that it need here be traced only in a general way. With Miss Ellen C. Semple's chapter on "Island Peoples"[9] as a

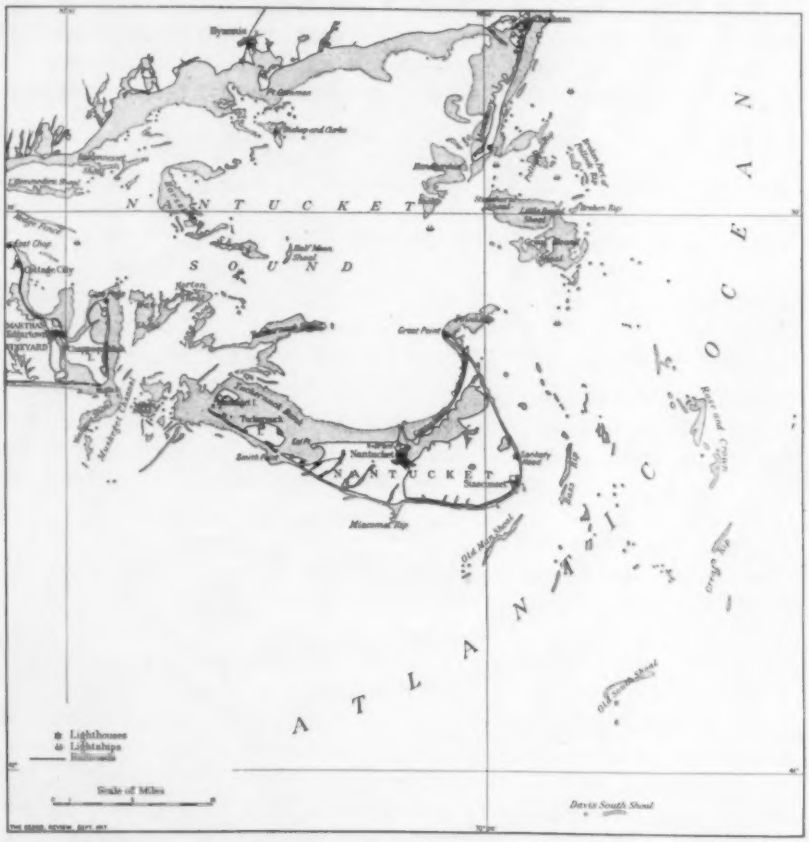


FIG. 1—Map of Nantucket.

background, this discussion will be confined chiefly to the effects of isolation on the constituent elements, character, and life of the people, and to the effects of small area on the economic development, density of population, and emigration. The original settlers were well fitted to be pioneers of American whaling. They were doubly selected: they seem to have been among the hardiest of those progressive people who for economic or religious reasons

[7] Douglas-Lithgow, *op. cit.*, pp. 346-347, gives the details of the home industries.
[8] 108 pp., Nantucket, 1915.
[9] Influences of Geographic Environment, 683 pp., New York, 1911.

came to America; for who else would move to a rather isolated, sandy island after having settled on the New England mainland? As the Indian population waned and whaling increased, more people were drawn from the mainland and crews were filled at the Azores and the Pacific islands and coasts. Furthermore, not infrequently, shipwrecked sailors found in Nantucket a welcome home. Thus in the last decade of Nantucket whaling, Marthas Vineyard was less cosmopolitan than Nantucket; but now, with the fishing and agricultural basis of these communities, the foreign-born element in both exceeds ten per cent (see Table I). The colored element in

TABLE I—NUMBER AND ORIGIN OF THE FOREIGN-BORN POPULATION OF NANTUCKET AND MARTHAS VINEYARD, 1860-1910

	IRELAND		ATLANTIC ISLANDS		PORTUGAL		GREAT BRITAIN		CANADA		TOTAL	
	N.	M.V.	N.	M.V.	N.	M.V.	N.	M.V.	N.	M.V.	N.	M.V.
1860.....	...	..	...	...	...	...	...	...	...	...	292	191
1870.....	106	24	39	39	1	0	17	21	16	5	202	105
1880.....	112	27	41	11	0	0	11	61	4	17	192	201
1890.....	104	42	50	86	0	136	22	45	31	77	235	449
1900.....	84	62	0	299	69	79	44	71	32	77	267	645
1910.....	62	36	0	192	210	220	50	89	59	94	418	642

the population has always remained small (see Fig. 2). English nobles and artisans, French Huguenots, Scotch, some Dutch, and "Americans" merged into Nantucketers, an island people. Judging by surnames, in 1790 the white population of 4,521 was composed of 4,426 English and Welsh, 62 Scotch, and 33 Irish.[10]

Of the descendants of these people, Douglas-Lithgow says:[11] ". . . . generally segregated from the outside world as they have long been in an insular environment, they have lived like one large family, in which the peculiarities of the original stock have been bred in and in without much external variation. They have developed, therefore, into a people capable of being distinguished by certain characteristics which are apparent to every off-islander during five-minutes' conversation." The life and customs of these people up to the middle of the eighteenth century are shown in interesting detail by William R. Bliss in his "Quaint Nantucket."[12] The town-crier custom survived in Nantucket until 1909.

The curious mixture of conservative and radical tendencies also may be ascribed to isolation. Thus, home improvements such as street-paving and water-works met with years of opposition from the townspeople;[13] but the

[10] "A Century of Population Growth in the United States, 1790 to 1900," 303 pp., Bureau of the Census, Washington, D. C., 1909.

The origins of the surnames found on the island are discussed by Miss Helen A. Gardner: Our Debt to the Huguenots. *Proc. Nantucket Hist. Assoc. 16th Ann. Meeting*, 1910, pp. 43-49.

[11] *Op. cit.*, p. 303.

[12] 225 pp., Boston, 1896; 2nd edit., 1897.

[13] See "Nantucket Town Meeting," by A. H. Gardner, on pp. 185-188 of "Sea-girt Nantucket," compiled by H. S. Wyer, 202 pp., Nantucket, 1902; also Bliss, *op. cit.*, 1st edit., pp. 176-191. "Sea-girt Nantucket" is an interesting and comprehensive compilation of articles written by many people. "Spun Yarn from Old Nantucket," edited by H. S. Wyer, 311 pp., Nantucket, 1914, is a book of well-selected readings on Nantucket life.

same men had explored in all the oceans. Nantucketers were the first to have specific knowledge of the Gulf Stream off the North Atlantic coast, and one of them was the first to map it[14]; also they discovered most of the important whaling banks and a large number of Pacific islands. They traded with distant ports, even with Canton, China, taking thither whale oil, sperm candles, Madeira wine, hard soap, and Spanish dollars at first, and later, sealskins in great quantities. The development of Quakerism as the dominant religion of the place in the eighteenth and nineteenth centuries is another example of the radical tendency fostered by island freedom from oppression.

The effect of limited area on insular history was never more clearly shown than during the Revolution and the War of 1812. Nantucket was always at the mercy of the sea-faring enemy, for the people could not resist the force of his superior numbers; nor did they dare to run the chance of famine from a complete blockade. The returns from the re-established fishing, amounting probably to less than 2,000 barrels,[15] and farming with a grain yield of less than 11,000 bushels in 1778, were insufficient. By remaining neutral, the inhabitants survived without being seriously plundered, and even obtained dispensations for Quaker sailors to procure wood and food from the mainland. Quaker frugality and non-resistance exactly suited

[14] See Alexander Starbuck: History of the American Whale Fishery from Its Earliest Inception to the Year 1876, Appendix A of *Rept. of the Commissioner of Fish and Fisheries for 1875-1876*, pp. 1-779, Washington, D. C., 1878; reference on pp. 55-56. This is a comprehensive account, accompanied by a large number of tables; it is one of the foundation stones of Nantucket history.

[The story of how this knowledge of the Gulf Stream came to light is not without dramatic interest. In 1769 the port authorities of Boston submitted a complaint to the Lords of the Treasury in London stating that on their westward voyages the English packets from Falmouth took something like fourteen days longer to reach New York than did the Rhode Island merchantmen to reach Narragansett Bay, and that a change of destination might therefore be advisable. Benjamin Franklin, being at the time in London as deputy postmaster-general of the colonies, was consulted. He sought the opinion of a Nantucket captain, Timothy (?) Folger, who was in London at the time. Captain Folger told him that the merchantmen were commanded by men from Nantucket who, from their whaling voyages, were well acquainted with the Gulf Stream, its course, strength, and extent and utilized their knowledge by laying their westward courses inshore, north of the Gulf Stream, thus avoiding the retarding influence of its current. The English captains had often been told of these conditions, but did not think it worth while to pay attention to what simple American fishermen had to say. Immediately on hearing this Franklin requested Captain Folger to lay down the course of the Gulf Stream on a chart. This information Franklin caused to be engraved on the old chart issued by the authorities in London (published "at Mount and Page's, Tower Hill"). He had copies of the new chart distributed among the Falmouth captains, but they persisted in sailing their old course. As the difficulties with the mother country were coming to a head, he did not urge the matter further and only after the Revolutionary War was over gave it wider currency by publishing it in the *Transactions of the American Philosophical Society* of Philadelphia (Vol. 2, 1786). See also Franklin's "Works," edited by —— ——, 1800, Vol. 3, pp. 353 and 364 (referred to by Starbuck); Governor Pownall: Hydraulic and Nautical Observations on the Currents in the Atlantic Ocean, with a corresponding chart of that ocean, to which are annexed some notes by Dr. Franklin, London, 1787; and J. G. Kohl: Aeltere Geschichte der Atlantischen Strömungen und namentlich des Golfstromes bis auf Benjamin Franklin, *Zeitschr. für allgemeine Erdkunde* (Berlin), Vol. 11, 1861, pp. 305-341 and 385-446, reference on pp. 436-441 (originally written in English in 1858 for publication by the U. S. Coast Survey, but never published in that form). Facsimiles of Franklin's map appear in (1) J. G. Kohl: Geschichte des Golfstromes und seiner Erforschung von den ältesten Zeiten bis auf den grossen amerikanischen Bürgerkrieg, Bremen, 1868, opp. p. 108; (2) Ludwig Mecking: Der Golfstrom in seiner historischen, nautischen, und klimatischen Bedeutung, *Meereskunde: Sammlung volkstümlicher Vorträge No. 51*, 1911, p. 15; and (3) Gerhard Schott: Geographie des Atlantischen Ozeans, Hamburg, 1912, p. 25 (reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 45, 1913, pp. 378-380).—EDIT. NOTE.]

[15] *Mass. Hist. Soc.*, 2nd Ser., Vol. 3, 1815, pp. 20 and 23.

the environment. Bliss[16] quotes from the journal of Thomas Chaulkley, a Quaker minister who visited Nantucket in 1737: "The people live in such a way that lawyers who plead for money, and doctors who prescribe for money, and preachers who preach for money have no employment on the island."

The economic limitation of a small island such as Nantucket is soon reached. The trees were quickly destroyed and the people became dependent on external sources for fuel and lumber. Undesirable animals, except the Indians' dogs, apparently were exterminated early; yet there is no lack of hunting, for there are myriads of migrating or wintering waterfowls.

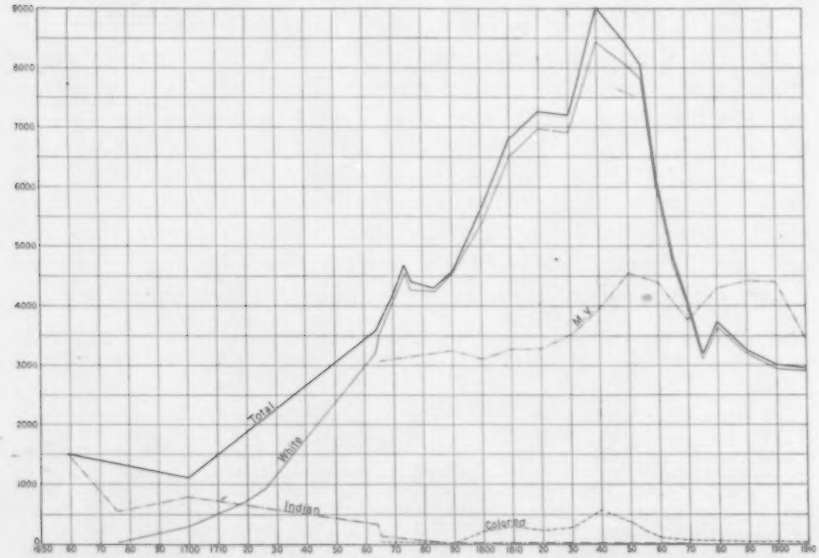


FIG. 2—Nantucket population. The curve marked M. V. represents the population of Marthas Vineyard. Sources: Obed Macy and Bliss for earlier years; national and state census reports for later years.

Agriculturally, Nantucket is not favored. Soon after the Europeans arrived, the area tilled reached a maximum which since has not been surpassed (see Table II), unless perhaps during the decline in whaling when the men turned to the land for support (1850 to 1870).

At best the yields were low, so farming gave way to the more lucrative whaling industry, leaving still the sheep-raising, which required a minimum amount of labor. As an offset to the poorness of the land, the richness of the sea is of great value. The great area of shoals in the vicinity has an apparently inexhaustible supply of sea food,[17] and quahaugs, flounders,

[16] *Op. cit.*, 1st edit., p. 98.

[17] Dr. G. W. Field of the Massachusetts Commission on Fisheries and Game has said that "this vast expanse of shallows outside the three-mile limit to the edge of the continental plateau is a submarine plain, richer even than the Mississippi Valley in potential capacity for producing human food. . . .". *Science*, N. S., Vol. 44, 1916, p. 227.

TABLE II—NANTUCKET FARMING

YEAR	NUMBER OF FARMS	ACRES OF LAND IN FARMS		POTATOES		MAIZE		OATS		RYE, WHEAT, AND BARLEY		HAY	SHEEP AND GOATS	CATTLE
		improvd	unimpr.	acres	bushels	acres	bushels	acres	bushels	acres	bushels	tons		
Early 18th C.*	..	....	....	....	....	875*	12,100*	680*	10,000*	95*	600*	....	.....	...
1775*....	..	....	....	....	....	....	....	....	....	..	....	....	15,000*	...
1778....	..	1,836	....	....	....	....	....	....	....	..	....	....	9,938	749
1784....	..	....	....	....	....	....	....	....	....	..	.. ..	....	3,000	693
1800....	..	2,042	3,360*	....	....	....	....	....	....	..	....	652 acres	.....	...
1810....	..	....	....	....	....	....	....	....	....	..	....	....	10,000*	520
1850....	58	3,792	4,265	....	5,997	....	3,206	....	972	..	1,289	1,439	977	597
1860....	124	6,763	6,382	....	5,129	....	8,709	....	1,005	..	1,141	2,440	1,077	835
1870....	105	4,062	7,147	....	7,424	....	7,921	....	2,045	..	997	2,177	1,219	809
1880....	87	5,805	13,676	68	5,310	214	3,108	11	216	0	0	1,214	1,376	666
1890....	36	1,485	1,187	33	2,802	64	2,501	21	0	0	0	610	412	258
1900....	54	2,026	2,051	....	....	....	....	....	....	..	....	....	.....	...
1910....	24	1,250	1,859	24	3,185	45	1,988	10	300	3	45	672	243	560

* Figures uncertain. Data prior to 1850 were gleaned from various Nantucket books; after 1850 figures are from the U. S. Census reports.

scallops, cod, and haddock have made the fishing industry of the island very prosperous of recent years.

During the height of whaling, agriculture dwindled under the labor competition of manufacturing. Also, sheep-raising on the commons ended,

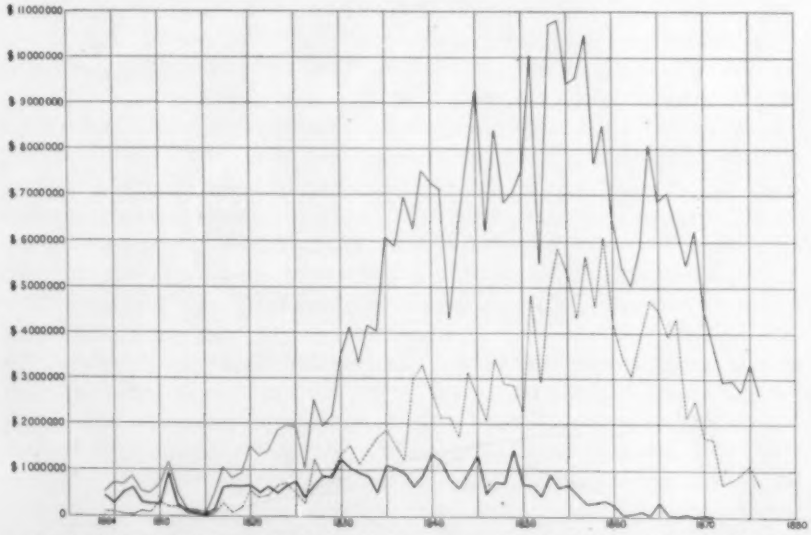


FIG. 3—Value of whale imports, including whale oil, sperm oil, and whalebone, 1804-1876. The uppermost curve represents imports for the United States; the dotted curve, New Bedford; the heavy lowermost curve, Nantucket. Sources: Starbuck and Obed Macy.

for some of the people illegitimately overstocked the range, and unconfined sheep became a nuisance; competition of western mutton and ravages of sheep-killing dogs also contributed to the decline. With the passing of the whaling industry fishing became an important means of livelihood, as when

whaling practically ceased during the Revolution and War of 1812. Then, too, the very shoals which are so valuable in fish also have yielded a sporadic but profitable winter wrecking business for some of the islanders. "During the fiscal year ending 1900, property valued at seven and one-quarter million was recovered from nine and one-half million imperiled, while only 48 lives were lost and 2,607 rescued."[18]

Isolation, formerly helpful, became excessive. As whales grew scarce, larger ships were needed to go on the two to four years' voyages to the Pacific; but the harbor was too shallow for them. Whereas, prior to 1831 but 10 out of 134 wrecks in the vicinity of Nantucket occurred on the bar, from 1831 to 1850, 33 out of 161 Nantucket wrecks occurred there.[19] The harbor made by a wave-built spit was limited in its usefulness by a wave-made bar. With this New Bedford on the mainland rose to the first place as a whaling port (see Fig. 3), for New Bedford is near Nantucket and has a good harbor.[20] The increasing cost of ships, a million-dollar fire (1846), the California gold rush, the discovery of petroleum (1859), and the Civil War quickly put an end to Nantucket whaling (see Fig. 3).[21] Even with a belated jetty channel begun in 1881, industries and trade have not been attracted by cheap labor and low rents, for raw materials and markets are too distant and storms and ice-blockades may for six weeks in winter prevent exchange with the mainland.[22]

With the changing effects of isolation and the concomitant changes in the economic control of a small area, the population has altered greatly (see Fig. 2). Until fifty years ago the density of Nantucket population was greater than that of the neighboring mainland. With probably 1,500 Indians[23] in the middle of the seventeenth century the density was about 30 per square mile. An equal density on the neighboring mainland would have called for a concentration of all the former Indian population of the United States into Massachusetts, Rhode Island and Connecticut.[24] This relatively great density seems to have been due to (1) the food area being greater than the land area; (2) isolation, which freed the Indians from outside attack and perhaps from epidemics; (3) lack of internal wars after the close contact of the tribes had forced them to draw a boundary line; (4) difficulty of emigration. In 1840, Nantucket's population density of 200 per square mile compared favorably with the corresponding figures: 80 in Barnstable County, 37 in Dukes County (Marthas Vineyard), and 83

[18] "Sea-girt Nantucket," p. 117. See also Gardner's "Wrecks about Nantucket."

[19] Compiled from Gardner's "Wrecks about Nantucket."

[20] W. S. Tower: A History of the American Whale Fishery, *Publ. of the Univ. of Pennsylvania: Series in Political Economy and Public Law No. 20*, 145 pp., Philadelphia, 1907. This book is apparently the best account of American whaling in its many aspects. It forms an excellent background for any study of Nantucket.

[21] *Op. cit.*, pp. 66-79, considers the causes of the general decline.

[22] See Bliss, *op. cit.*, 1st edit., p. 216, and Nantucket Weather Bureau records.

[23] Obed Macy, *op. cit.*, p. 17.

[24] Mr. J. Mooney estimates the former Indian population of the United States to have been 860,000. See *Science*, N. S., Vol. 43, 1916, p. 826.

in Massachusetts, Connecticut, and Rhode Island together. This density was due primarily to the whaling interests, but, as a focal location for trade, Nantucket also claimed many who were not engaged in whaling. For example, in 1821 of a total tonnage of 27,496 belonging to Nantucket, 23,213 was engaged in whaling, 3,885 in coasting, 352 in foreign trade, and 43 in cod-fishing.[25] Nantucket's present (1910) density of population of 67, which in summer is trebled, is far behind the 350 per square mile in industrial southern New England.

As is usually the case with islands, the population increased more rapidly than the development of the resources, and emigration resulted. Nantucket

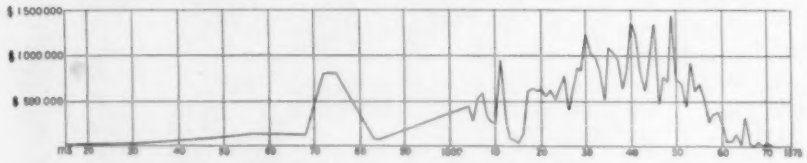


FIG. 4—Nantucket whale imports from the earliest records to 1875.

has sent its people to all parts of the world. Many men became masters sailing from other ports; Nantucketers built the whaling business in many American, Canadian, British, French, and even Chilean ports. Some colonial groups kept their home ties and in this way helped Nantucket trade. The New Garden colony in North Carolina sent out tobacco, foodstuffs, and naval stores; one on the Kennebec, in Maine, supplied lumber and food. Emigration occurred in waves according to the economic condition at home and to the possibilities elsewhere. Frequent over-supplies of oil (see the variation in the whale-products curves, Fig. 3), foreign bounties or tariffs, or loss of ships were the cause of numerous depressions.[26] While the Revolutionary War was threatening, emigration was stimulated. During the war, few could leave the island; but in the years of economic depression after the war many moved away, some to become farmers, others to be whalers from enticing foreign ports. Similarly, in the first two decades of the nineteenth century there was considerable emigration. After the destructive fire of 1846, at a time when the whaling business was becoming unprofitable, the discovery of gold in California is said to have drawn off 1,000 of Nantucket's people in three years. Emigration continued apace, especially after the panic of 1857, as Nantucket declined to the virtual death of her commerce and industry. The preponderance of young men in 1850 changed to a dearth in 1860 (see Table III). Of the 1,878 males 10 to 29 years of age in 1850, apparently 721 left Nantucket in the decade—30 per cent of all the emigrants! Marthas Vineyard, on the other hand, had an accession of 152 males of 20-29 years in 1860 as compared with 1850, for Edgartown

[25] Obed Macy, *op. cit.*, p. 216. See also pp. 51 and 138 for information about trade.
[26] *Ibid.*, pp. 50 *et seq.*

TABLE III—NANTUCKET POPULATION CLASSIFIED BY COLOR, SEX, AND AGE, 1850 AND 1860

	AGES									TOTAL
	0-14	15-19	20-29	30-39	40-49	50-59	60-69	over 70	Unknown	
WHITES										
1850										
Male	1,239	436	896	555	420	268	194	111	0	4,119
Female	1,274	346	610	532	424	322	229	201	1	3,939
1860										
Male	833	274	361	295	339	264	225	146	0	2,737
Female	796	332	507	411	372	337	265	209	0	3,229
COLORED										
1850										
Male	39	20	127	40	24	14	6	2	0	272
Female	27	15	24	20	15	15	1	5	0	122
1860										
Male	13	9	9	6	6	8	3	1	0	55
Female	15	8	8	9	12	10	7	4	0	73
CHANGE 1850-1860										
Male	−432	−173	−653	−294	−99	−10	+28	+34	...	−1,599
Female	−490	− 21	−119	−132	−55	+10	+42	+ 7	−1	− 759

with its better harbor had fallen heir to some of Nantucket's whaling. Even though in the seventies the coming of the summer people softened the decline, the young and energetic still left the island, so that in the eighties—and perhaps it is true today—Nantucket claimed to be the "healthiest town in Massachusetts" because the age at death of so large a proportion exceeded 70 years (35 out of 75 in 1880).[27] The population has apparently become stable now, for the great preponderance of females over males which has existed since the fifties is rapidly disappearing: the 1,299 males in 1900 increased to 1,361 by 1910; but the 1,707 females changed to 1,601 in the same decade. Thus the difference, which was 408 in 1900 and 240 in 1910, may point to a tendency toward revival in the economic status of Nantucket.

On account of their isolation the primitive Indians, as has been said, showed some retardation in development. On the other hand, the civilized Europeans found the environment very favorable to the evolution of a distinct society untrammelled by the strifes of the mainland peoples. Though progressive in whaling, Nantucketers became conservative in home affairs. Their language became a nautical dialect; and old customs long survived the day when progress eliminated them on the continent. The very isolation which favored Nantucket's development well into the nineteenth century, brought impoverishment when conditions for the prosecution of whaling and trade became more favorable in continental ports.

The ocean environment which led to the fishing and whaling industries saved the fortunes of the people who remained after the whaling days. Nantucket became a thriving summer resort (it has some 10,000 summer visitors now). The summers are relatively cool; there is plentiful fishing; surf is high; the water is warm; and, as a whole, Nantucket is a quiet distant place with scenery unlike the rest of New England. In winter, some duck hunters and the quahaug dredgers break the monotony.

[27] E. K. Godfrey: The Island of Nantucket, etc., 365 pp., Boston, 1882; reference on pp. 277-278. A comprehensive guide-book with the items arranged alphabetically.

When will farming again come into its own? The island Nantucket has little to offer except a good climate; the soil, poor for tilling, supports a dense dwarf vegetation and has shown itself well fitted for sheep-raising. The shoals and ponds yield abundant fish and attract numerous waterfowls. Some 300 acres of the swamps are used for a new and thriving cranberry industry. A unit of 240 acres with 35 miles of canals is said to be the largest cultivated cranberry bog in the world. Most of the pickers are Portuguese negroes. High winds, cool nights, much fog, and lack of easily available fertilizer may hinder agriculture, but it is apparently the indifference of the people which is chiefly to blame for the annual importation of about $200,000 worth of farm produce while the countryside lies idle. Sheep-raising and dairying combined with truck-farming could thrive on the local market alone. For fertilizer there is plenty of lime (shells), peat, and kelp. Some of the summer truck-gardeners might copy profitably the seasonal migration of the hotel workers and part of the trades-people, and live on the mainland in winter. The future of the island may be full of promise; but now, on seeing the miles and miles of unused land, covered mostly with scrub oak or other low plants, one gets an overpowering feeling that Nantucket is a land of wasted opportunity.

THE RÔLE OF POLITICAL BOUNDARIES

By DOUGLAS W. JOHNSON

Boundary disputes have ever been potent causes of war. A treaty of peace not infrequently constitutes the *casus belli* of a new conflagration, because it imposes upon some belligerent illogical and geographically impossible boundaries. The first shot of the second Balkan war was fired during peace negotiations at the close of the first; and the treaty of peace which terminated the second conflict laid the basis for Bulgaria's last assault on Serbia. In each case a political boundary which deprived Bulgaria of certain real or fancied geographical advantages was the cause of war. Italy rejected Austrian tenders of territory and entered the present war against her former ally because the latter would not agree to a boundary designed to secure Italy against invasion from the north.

Manifestly anything so pregnant with dangerous possibilities as a political boundary demands careful study. Not until the rôle which a boundary line should play in the economy of nations is fully understood will it be proper to seek the ideal boundary line. Not until the comparative value of different physical features on the earth's surface in performing the desired rôle has been determined will it be possible to say which natural boundaries are best. The geographer is always profoundly interested in any discussions bearing on these vital points and particularly so at a time when such discussions have more than ordinary significance in view of the new map of Europe which must soon be drawn. A brief review of four recent papers dealing with boundary problems, two from the standpoint of general principles and two relating to a concrete case, may therefore be in order.

One view of the rôle of political boundaries is ably defended by Colonel Sir Thomas H. Holdich.[1] Col. Holdich frankly affirms that the best way to preserve peace amongst the nations is to part them by as strong and as definite a physical fence as can be found. The political boundary must be a formidable barrier. It may be either natural or artificial, but in either case it should be as continuous and as unbroken as circumstances permit. Prevention of war is better than cure, and one of the best preventives is an international boundary which limits the capacity of angry disputants to get at each other. The skill of man can enormously increase the value of such a boundary by constructing an intricate tracery of trenches and fieldworks to link one natural obstacle with another. In this author's opinion the European boundary of the future may well become an actual

[1] Political Boundaries, *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 497-507.

military barrier bristling with obstructions and points of steel, a barrier so formidable as to approach the ideal of absolute security.

On the basis of this conception of political boundaries, Colonel Holdich proceeds to discuss the relative merits of different natural features as boundary lines. In his view mountain ranges are incomparably the best, since they often constitute impassable border lands, presenting on either hand "a magnificent wall of defense, unbroken, impressive, defiant." It is recognized that in the past armies have been conducted through mountain passes, but the author thinks this phase of history is not likely to repeat itself. The most magnificent natural boundary in the world is considered to be the Himalayan ranges, parting India from the uplands of central Asia and securely defending it from northern invasion. Lesser ranges have a high defensive value, as witness the rôle of the Carpathians in checking the Russian advance on Hungary. Even a comparatively low divide may give sufficient command in altitude to be of decisive military importance.

Rivers are ranked next in value to mountain chains as natural boundaries. They are easily visible and often constitute formidable military barriers. Lakes may be serviceable in boundary-making; and while the position of the actual boundary line may be ill-defined in the broad expanse of waters, the exact position, as in the case of a desert boundary, is of small consequence. Expanses of lake waters and expanses of dry desert are barriers, which, although capable of being crossed, nevertheless commonly separate the peoples of the more habitable regions on either side. Marshes are admitted to have played an important rôle as military barriers in the strategy of the present war, but are rejected as boundary lines for reasons not wholly convincing. Imaginary straight-line boundaries—whether parallels of latitude, meridians of longitude, or azimuth lines—having no natural value as barriers, are classed as "almost invariably bad," and considerations other than military are urged against them.

One may take Colonel Holdich's view of the rôle of political boundaries and still not follow him in all his conclusions. It is interesting to note, for example, that military authorities are by no means agreed as to the defensive value of mountain barriers. Mountainous topography presents obstacles to defensive warfare as well as to operations of an offensive character. Attacking forces have the advantage of being able to concentrate for a crushing blow at any selected point on the line of defense. The defenders cannot concentrate until the blow is about to fall, but must then do so with great rapidity if they are to prevent the breaking of their line by superior forces. Such rapid concentration is always difficult, and sometimes quite impossible, in a region of rugged topography and few good roads. The Archduke Charles was of the opinion that in mountain warfare the advantage was beyond comparison on the side of the attacking army, an opinion further supported by Colonel J. R. Jackson in his little manual

of military geography.[2] Only in case the war be a *national* war, with the defenders supported by the whole population of the mountainous country, does the task of the invader become insuperable, in Jackson's opinion. Other military writers consider mountains favorable for a tactical but not for a strategical defense.

It is interesting to note that Colonel Holdich's faith in the value of great fortresses as adjuncts to a political boundary has not been shattered by the fate of Liége, Namur, Maubeuge, Antwerp, and the fortified cities of the eastern theater of war. The grounds for his faith do not appear wholly valid, for he credits the original German plan of an attack through Belgium to German respect for the great fortresses from Verdun to Belfort. There is good reason to believe, however, that the unfavorable character of the topography of northeastern France figured more prominently in the decision of the German general staff. Certainly the Colonel is in error in citing Verdun in support of his theory, for the real defense of this historic site was not made from the famous permanent fortifications but from temporary fieldworks so skillfully located as to take every advantage of the natural defensive barriers afforded by a dissected cuesta trenched by an incised meandering valley and its tributaries.

A point of view quite the opposite of that championed by Colonel Holdich is presented by Professor L. W. Lyde.[3] In Professor Lyde's opinion the ideal political boundary is not an impassable barrier limiting the capacity of angry disputants to get at one another but "a feature which actually encourages peaceful international intercourse." Since rivers draw the inhabitants of their basins together and offer a maximum of peaceful associations, they are pre-eminently to be desired as boundary lines. Some concession to the military viewpoint appears in the admission that while rivers offer no check to peaceful intercourse, but rather encourage it, they are the more valuable as boundaries because they do serve as checks to unpeaceful intercourse. Emphasis is laid upon the defensive value of river barriers in the Balkan and Eastern campaigns of the present war, a point already discussed at some length by the present writer in earlier numbers of the *Review*.[4] Other advantages of river boundaries are touched upon, as, for example, the obvious ease of observing the exact position of such a line of demarcation, and the rather questionable supposition that rivers by a rough bisection of their basins make a fairly even division of the enclosing regions and their included mineral wealth.

It must be said that Professor Lyde does not adequately present the objectionable features of rivers, which have given rise to much difficulty with river boundaries in the past. No one can study the varied terms in which river boundaries between our own states are defined without realizing

[2] Military Geography: Its Nature, Object, and Importance. 62 pp., London, 1850.

[3] River Frontiers in Europe. *Scottish Geogr. Mag.*, Vol. 32, 1916, pp. 545-555.

[4] The Great Russian Retreat. *Geogr. Rev.*, Vol. 1, 1916, pp. 85-109; The Balkan Campaign. *ibid.*, Vol. 2, 1916, pp. 27-47.

that the exact delimitation of such a boundary is far from simple. If a shifting river course can cause endless litigation between two states of the same Union, what trouble may it not cause between different nations? Those most familiar with the Rio Grande as an international boundary will hardly confirm Professor Lyde's good opinion of it. More than once its eccentricities have brought Mexico and the United States to the verge of armed conflict, and a special commission has had to undertake the solution of the endless problems it presents. Rivers do tend in some measure to unify the peoples occupying their basins; but will the unit population not often object to being under the control of two different governments? In new lands, such as Africa, proposed river boundaries have had to be changed to divide boundaries, because the single native tribe occupying a given river basin could not well be separated into two independent groups under different civil and military jurisdiction. The counts in the indictment against rivers could be extended indefinitely, and they must be answered before a satisfactory agreement can be reached as to what constitutes the ideal natural boundary.

The latter part of Professor Lyde's discussion has little to do with river frontiers, as it deals with certain broad changes in territory economically and strategically desirable from the standpoint of England and her allies.

As a good illustration of specific boundary problems in which strategic and linguistic considerations appear to be in irreconcilable conflict, we may select the Trentino frontier. The strategic character of this part of the Austro-Italian boundary has been described by the writer.[5] As was there pointed out, Austria enjoys every strategic advantage in the region in question. The boundary line follows lower crests south of the main divide and is, therefore, dominated by higher points in Austrian territory. It also runs transverse to the main valleys of the southern Alps, which open southward into Italy and facilitate an Austrian descent upon the plain of the Po. This position of the boundary, furthermore, leaves a large Italian-speaking population within Austrian territory.

Whatever the outcome of the present war, some rectification of the present frontier to the advantage of Italy may confidently be expected. Such rectification was, indeed, the subject of negotiations between Austria and Italy prior to the latter country's entry into the war in 1915. Austria at that time proposed to cede to Italy a portion of the Trentino, or "Süd-Tirol," as it is illogically called by the Germans. The territory which Austria was willing to abandon to prevent Italy from joining the Allies coincided roughly with the extension of the Italian language north of the Italian frontier. Italian demands presented then were based, however, upon strategic necessities as well as upon linguistic considerations.

[5] Geographic Notes on the War: The Austro-Italian Frontier, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 526-529.

They therefore outlined a frontier farther north, nearer to the Adriatic watershed.

An interesting discussion of this whole problem is presented by Douglas W. Freshfield.[6] As set forth by Mr. Freshfield, the Italian claim may be summarized as follows: Starting from Switzerland the present boundary line shall be maintained to Mount Cevedale, whence the new line strikes east to the Illmenspitze and thence northeast to Klausen (its name betrays its strategic importance), passing through Gargazon. From Klausen the line leads to the south until latitude 46° 30′ is attained, after which it resumes its easterly course, passing through Tofana and reaching the old boundary four miles northeast of Cortina d'Ampezzo. The population of the last-named district, formerly Ladin, is now Italian. This boundary revision would give political validity to the Italian Alps, a region which Mr. Freshfield, on the basis of his own observations and supported by quotations from Ratzel, shows to be geographically Italian. It would, furthermore, transfer to Italy strategic control of the entrance to the Vintschgau, of the valley of the Upper Adige, and of "the gorge of the Eisack at Klausen with the issue of the Brenner and Pustherthal railways." The new frontier has the additional merit of being identical with the old Bishopric boundary from 1106 A. D. to the Reformation. The flaw in the proposed rectification, if any exists, is due to the fact that the Bozen district is Teutonic in speech and feeling, although economically it is Italian. The rest of the population in the Trentino favors annexation to Italy.

A contribution to the same problem from the Teutonic point of view is made by R. von Pfaundler.[7] Von Pfaundler's paper is essentially a discussion of the Austrian offer to Italy in 1915. The line proposed diverges from the Italian project at Illmenspitze, and strikes south in such manner as to avoid cession to Italy of any territory of German speech. In doing this, however, it leaves some of the Italian-speaking northeastern districts of the Noce valley in Austrian territory. All the mountain outlets which converge into the Adige valley are also retained by Austria. From the Italian standpoint this is inadmissible, as it would leave the southern country unduly exposed to unwarranted aggression from the north.

On the basis of the Austrian census for 1910, von Pfaundler thus tabulates the changes in population consequent upon such a boundary revision as Austria proposed:

	Italians and Ladinians	*Germans*
In territory offered by Austria.....	366,837	13,892
In territory retained by Austria.....	18,863	511,222

Relying upon the same source of information, he shows that Italy's official claim implies the inclusion in Italian territory of 74,000 Germans

[6] The Southern Frontiers of Austria. *Geogr. Journ.*, Vol. 46, 1915, pp. 414-433.
[7] Oesterreichisch-Italienische Grenzfragen, *Petermanns Mitt.*, Vol. 61, 1915, pp. 217-223.

along with the 371,477 Italians and Ladinians who would thereby be incorporated in the southern kingdom.

To the impartial observer it would seem that the Italian claim offers the more equitable division of those strategical advantages which each nation considers essential to national security. It would leave to Austria the watershed, a position admirably suited for defense; and would at the same time award to Italy control of the outlet passes. Each country would thus find itself secure from sudden aggression on the part of the other. The Austrian offer, on the contrary, altogether disregards Italy's strategical necessities.

The four papers reviewed above are typical of many discussions now occupying the attention of geographers and serve to illustrate the nature of the problems which very shortly will command the interested attention of the whole world. Whether from the standpoint of the general principles involved or from that of the practical application of those principles to concrete cases, the early selection of new boundaries for certain European countries will demand, and should receive, the best knowledge and highest skill of both geographer and statesman.

THE PASSING OF THE FAHRENHEIT SCALE

By ALEXANDER McADIE
Director of the Blue Hill Observatory

Geographers may have noticed that in recent climatological work, and in all exploration of the atmosphere, temperatures are not given in Fahrenheit degrees but in degrees Absolute Centigrade. They will notice, too, that the familiar degree sign (°) is now omitted and reserved for degrees of angular measurement. Geographers have a right to ask why such changes are necessary.

The prime reason is that in exploring the upper air and in all work relating to the structure of the atmosphere, or *aërography*, the majority of the readings are below the zero of both the Centigrade and the Fahrenheit scales. This results in a multiplicity of minus signs. At a height of four kilometers and above, temperatures are below the zero of the Centigrade scale, even in mid-summer and even over the equator; and at a height of six kilometers the same is true for the Fahrenheit scale.

A second reason is that half the world, the larger half, uses the Centigrade scale; and the rest, except a small portion to be mentioned later, uses the Fahrenheit. In Germany and some other parts of Europe, a third scale is used, chiefly for domestic purposes, known as the Réaumur, with the ice point marked 0° and the steam point 80°; but this scale is so little used by scientific men that in the International Tables, no conversion tables are given. It is not necessary to give in detail the steps in the development of the thermometer from the crude instrument of Galileo and the form used by Sanctorius to modern standards, nor may we here discuss the evolution of thermometer scales. The Fahrenheit scale ran originally from 0° to 8°, the former being the lowest temperature then obtainable by artificial means and the latter being the temperature of the human body. Subsequently each degree was divided into 12 parts. Later the freezing point was marked 32° and the boiling point placed 180° higher and marked 212°. The zero of the present Fahrenheit scale is 459.4° above the so-called absolute zero or, to express it in other terms, the absolute zero or zero of no molecular motion is 491.4° F. below the freezing point of water.

There have been various temperature scales, one being that of Sir Isaac Newton, where the ice point was 0° and the temperature of the human body 12°. The original centigrade scale had the boiling point marked 0° and the freezing point 100° and was known as the Celsius. Linnæus reversed the order.

Now it will be conceded that if we are to use a zero or starting point it is advisable to use the ultimate rather than some intermediate value. There

is such an ultimate value in temperature, determinable in two ways, one known as the absolute thermodynamic method and the other as the hydrogen gas thermometer method. The latter, which is the adopted method, gives a coefficient of expansion such that we can express the zero as —273.02° C.; or the freezing point on the Centigrade scale is 273 degrees higher than this zero. If, then, we start with this zero there will be no need for minus signs; and largely for this reason physicists, chemists, and others have begun to use generally the Absolute Centigrade scale.

Many meteorologists hold that the Fahrenheit scale has one great advantage over both Centigrade and Absolute, in that, the scale division being smaller (nine divisions on the Fahrenheit corresponding to five on the Centigrade scale), it is possible to give readings with more definiteness. Some climatologists think that the Centigrade scale division is too large for their purposes; but as a matter of fact the errors of exposure are so much larger than errors of reading that the refinement seems unnecessary. Nevertheless, to meet the objections of meteorologists, climatologists, and others, the writer has proposed a new scale, a new absolute, which for want of a better name may be called the New. The starting point is the same as in the Absolute and is written 0. The freezing point is marked 1,000. The diagram herewith (Fig. 1) shows the readings on the four scales in close proximity so that the general relations can be readily grasped.

The scale divisions on the New scale are even smaller than the Fahrenheit and meet the problem of refinement of reading. Again, as in the Absolute scale, there are no minus signs. In the third place, there is a saving of figures in tabulating, printing, and even speaking, although at first

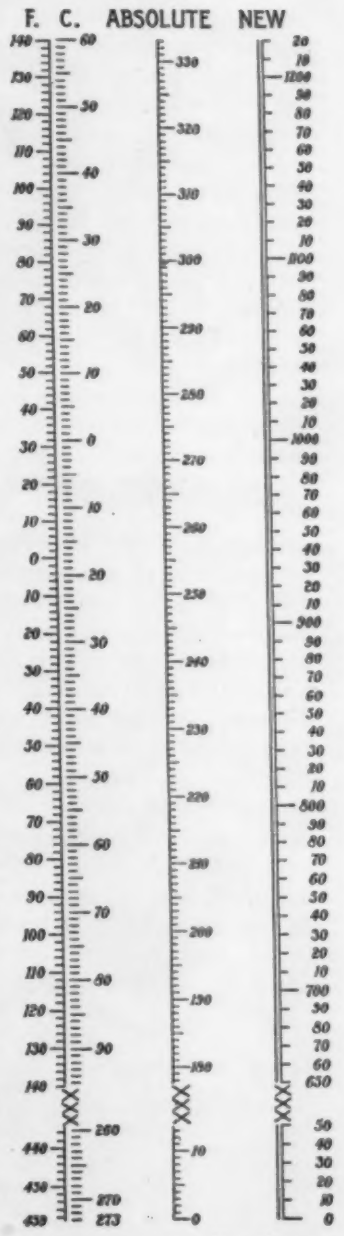


FIG. 1—Comparison of four thermometer scales, Fahrenheit, Centigrade, Absolute, and New.

glance this might not seem to be the case. Fourth, the New scale makes for accuracy in compilation, as an erroneous entry is more easily caught by the eye, and in the determination of mean values the larger units are of the same order.

Fifth, there is a fundamental distinction between *warm* and *cold*, which is shown by the range of one hundred divisions, all readings below 1,000 being *cold*, and all readings above 1,100 being *warm* (on the Fahrenheit scale these would be 32° (freezing) and 80° (summer heat).

Sixth, winter temperatures are more readily and definitely given, as e. g. —10.8° F., a not infrequent reading in many parts of our country in winter, becomes 915. In tabular work, only three pieces of type would be needed in place of eight.

Seventh, when it is very hot or very cold, the public wants the fullest details. Fine distinctions or graduations appeal to the imagination at such times, especially if conditions approximate a record. Given an extremely warm day, it could be described on the New scale as "eleven forty," 1,140; and an extremely cold day as "nine ten," 910. The equivalents are 100.6° F. and —12.1° F. and 38.3° C. and —24.6° C. respectively.

Finally, there is an educational aspect which is perhaps of more importance than all the preceding arguments. To the teacher, it is always difficult to explain, so that a class clearly grasps the relation, the law of Charles or yet again the characteristic equation of a pure gas. The fraction 1/273 is an awkward figure to remember and the student mind resents such a coefficient of expansion, which seems to him irregular and unnatural. When relations are not clearly comprehended, they are readily forgotten. The new scale makes for clearer conceptions of the nature and magnitude of temperature changes. It starts from a definite value, one that has a distinct physical meaning, and also makes use of that most familiar change of physical form, water to ice. If we could only introduce at the freezing point and at the boiling point some auxiliary extension tables giving the degrees of heat of fusion and evaporation, the so-called latent heats, then the whole conception of heat, the whole process of molecular change, the work-equivalent of heat and the heat-equivalent of work would take on a new aspect for the student.

GEOGRAPHICAL RECORD

NORTH AMERICA

The Navajo Country. The Navajo, Apache, and Hopi Indian reservations of Arizona and New Mexico and the areas immediately about them form a geographic province of singular interest in regional geography, and one practically unknown until the publication by H. E. Gregory of an article entitled "The Navajo Country" in the former *Bulletin* of this Society (Vol. 47, 1915, pp. 561-577 and 652-672). Prof. Gregory has extended his writings since that time and under the same title has now produced a government report on the water supply of the region, including notes on the geology, topography, climate, vegetation, and early exploration. The field surveys covered the period 1908-1913; and the published report represents an extensive and important reconnaissance survey. It will long be practically the sole source of geographic information on a remarkably interesting portion of our domain where man's adaptation to a rugged and desertic land is of the most extreme kind.

The photographs deserve special mention in that they represent to an unusual degree the characteristic as well as the striking geographic and geologic aspects of the country. A large map (Pl. 1) shows the routes of earlier scientific expeditions, the locations of buildings, the relief (by hachures), the drainage, and the boundaries of the geographic provinces. The forest map (Pl. 19) by G. A. Gutches is a real contribution and brings out in a striking manner the effects of relief upon rainfall and vegetation. It is with respect to these features that the plastic character of the Indian population is so well expressed. The report supplies a broad physical basis for further research, though its usefulness would have been enhanced by a general summary of conclusions.

There should soon be undertaken a thoroughly scientific anthropogeographic investigation of the desert western country (if possible in connection with the next census) to the end that we may ultimately have a population map showing the *real* distribution of the people. Jefferson's studies, and particularly his paper entitled "Utah, the Oasis at the Foot of the Wasatch" (*Geogr. Rev.*, Vol. 1, 1916, pp. 346-358) emphasize the striking distribution of the belts of desert population as brought out on maps whose boundaries follow natural division lines and not the borders of minor political divisions that have no diagnostic value.

Avalanche Wind Near Juneau, Alaska. Winds resulting from avalanches or landslides are an interesting group in any complete classification of the winds of the world, but are of relatively rare occurrence. On Jan. 26, 1917, as a result of a heavy snowslide into Gold Creek Gulch, an avalanche wind occurred near Juneau, Alaska. The force of the blast generated by the down-rushing snow was sufficient to demolish some cabins and to carry their débris up the opposite slope, together with some 4 x 4-inch timbers and 12 x 2-inch cross planks of a board walk. A large piece of concrete chimney was also carried up the slope. The wind had a lateral as well as forward component, for it destroyed a cabin 500 feet down the gulch in the direction of Juneau, the edge of the city being only about a quarter of a mile away. The wind was felt throughout the city. A blinding whirl of snow came with the wind, and enveloped the city in semi-darkness for several minutes.

R. DEC. WARD.

A New Map of the Physiographic Divisions of the United States. The Association of American Geographers, organized in 1904, has been one of the most important instruments in America for the encouragement of geographic research. Among its achievements since its foundation there is certainly none other so important as the physiographic map of the United States produced by a special committee of which Prof. N. M. Fenneman was chairman (Physiographic Divisions of the United States, *Annals of the Assoc. of Amer. Geographers*, Vol. 6, 1916, pp. 19-98; map, Pl. 1, scale 1:7,000,000). We recognize in this work two qualities—the one scientific, the other diplomatic. Professor Fenneman devoted the best part of a year to the task of compiling the essential facts and arranging them in systematic order. It was then necessary to secure discussion on the part of the members of the committee and concurrence on questions of boundary delimitations. When we consider the vast extent of the territory involved and the salient personalities of the men who were bound to be associated on such a committee, it increases our admiration for the happy results which have been achieved under Professor Fenneman's leadership. Every other member of the committee, and especially M. R. Campbell of the U. S. Geological Survey, likewise deserves the thanks and congratulations of the Association of American Geographers.

The detailed characterization of the article and the map is outside the purpose of this notice. We need indicate only a few leading features. The United States is divided into primary divisions, as represented in a general way on maps heretofore known to physiographers; but each division is further divided into provinces and sections. Of the former there are 24 and of the latter 88, counting undivided provinces. The characteristics of each minor section, expressed in terse technical language, are particularly helpful. The assistance given by such a characterization in further research is beyond praise. It matters little that the boundaries of the provinces will be subject to minor changes in later years or that the technical descriptions may require modification as each minor section becomes better known through detailed surveys. The point of chief importance is that we now have an authoritative beginning for the interpretation of the human life of the United States. Hereafter the regional geography of the country will be written on an entirely new basis.

No better service could now be rendered than that of interpreting the distribution of population in terms of physiographic regions. Here lies the great importance to geographical science of the next census. It would be an almost inconceivable neglect of opportunity to have the population maps drawn without reference to the boundaries of the physiographic provinces. Detailed physiographic field work is essential to supplement the statistical facts and this ought to be done in co-operation with some physiographic committee which would actually and precisely delimit the details of each boundary in the field. The county unit is too gross for this purpose and even the township unit ought to be split in critical cases. This would afford geographers an opportunity for the first time to make a really scientific study of the distribution of population. It is not meant to imply that physiographic features are a primary control of distribution. But relief, and all that goes with it, is in many cases the primary control; and the extent to which this control is exercised can never be demonstrated—physiographic influence can never be isolated from other influences—until a study is undertaken on this plan. The Census Bureau will surely not fail to seize this great opportunity.

Corn-Growing under Droughty Conditions in the United States. The detailed study of climatic data in connection with agriculture is one of the increasingly important developments of modern climatological research. It is a significant fact that many of the recent publications emanating from the Bureau of Plant Industry, the Office of Farm Management, and the Weather Bureau are concerned with these economic aspects of climatology. Clearly, *economic climatology* is now of sufficient importance to warrant the use of this term. Messrs. C. P. Hartley and L. L. Zook, of the Bureau of Plant Industry, have been investigating corn-growing in the drier portions of the United States (*Farmers' Bull. 775*, U. S. Dept. of Agric., Washington, 1916). Farmers from the East have for fifty years been attempting to raise corn in the semi-arid West. The seed and the methods used were almost always those of the East, not adapted to western climatic conditions and hence often resulting in failure. It is the purpose of this bulletin to indicate the causes of these failures and to show how failures may become less frequent and less serious. An improvement of the yield of corn per acre and a less wasteful utilization of the crop are important. The average acre yield is now less than one-half what it might easily be, and while it is increasing in the older states, it has remained about 27 bushels for the country as a whole. This fact has been largely due to the expansion of corn-growing into semi-arid and otherwise unsuitable regions. The cultivation of corn under droughty conditions "is largely a matter of taking chances with seasonal conditions." On the other hand, there are certain controllable conditions of soil and seed which frequently determine the success or failure of the crop. It is with these latter factors that this bulletin is concerned. R. DEC. WARD.

New York as a World Market for Cacao. In 1915 New York became the coffee capital of the world and the clearing house for Europe. That a similar position will be occupied in respect of cacao appears probable (*Commerce Repts.*, 1917, No. 66). During the fiscal year ending June 30, 1916, advance in this direction continued; the re-exports of cacao were about $31,500,000 against $29,000,000 in 1915 and $4,500,000 in 1914. As the leading buyer of the crude product New York made great gains also, the increase in quantity and value being respectively 26 per cent and 53 per cent over 1915, itself a record year. Contributory to these movements are changes in the ports of shipment. Several cacao-producing countries are now shipping direct to the United States for the first time. Such are British Guiana, Peru, the Dutch West Indies, French Africa, and, most important, British West Africa, from which last place the output has greatly increased in quantity and improved in quality. Importation from British West Africa was only exceeded by that from the Dominican Republic, Brazil (which showed a gain of 300 per cent over the previous year), and Ecuador.

SOUTH AMERICA

A New Port on the West Coast of Peru. The desert coast of Peru has over thirty main valleys, each of which has an irrigated alluvial floor, a port at the valley mouth or in some sheltered curve of the coast near by, and barren desert country between it and the neighboring valleys on either hand. The desert coastal strip is narrow and, save for Lima and Arequipa, there are no really large towns. Each valley is notably independent. Trade and even travel are by way of the sea rather than overland. The effect has been to call into existence a large number of small "ports." In the main these are distinctly primitive. Callao is the only one in which ships can discharge their cargoes directly upon the docks. All others are reached by lighters which in turn discharge at steel piers built out beyond the reach of the surf as at Eten or in some sheltering cove as at Mollendo. The expense of huge modern port works could not be borne by any one of the valleys and since railways run down to the coast, and not along it, no valley can attract the trade of a number of adjacent valleys. It follows that small steamers, easy to build and with moderate operating losses due to port delays, serve the commercial interests better than large vessels of the trans-atlantic type.

FIG. 1—The position of the port of Malabrigo (underlined) in relation to the neighboring ports of Peru.

On the map, Fig. 1, it will be seen that Salaverry is one of the chief ports of Peru. It is the outlet for one of the richest valleys of the coast. But it is exposed to the strong surf; and therefore the sugar interests of Ascope, an interior town, have arranged for the construction of a new port at Malabrigo, which is sheltered by Malabrigo Point against the prevailing southwest winds. A railroad will connect the Ascope plantations with the new port and serve not only the sugar trade but mining interests as well, thereby competing seriously with the dock and railway at Salaverry and making one more port of call for the already over-crowded schedules of the west-coast steamers (*Commerce Repts.*, March 30, 1917, No. 74). According to Vallejo's Mapa del Perú published in 1912 by the Sociedad Geográfica de Lima (scale 1:1,500,000) the distances in straight lines from Ascope to Malabrigo and from Ascope to Salaverry are 22 miles and 37 miles respectively.

The Effects of the War on the Chilean Nitrate Region. One of the first effects of the war was greatly to depress the nitrate industry—practically the sole basis of the commercial life of the pampa region in northern Chile. Banks failed or suspended payment; longshoremen out of work threatened disorder; and many of the nitrate *oficinas* were obliged to close. Hundreds of laborers came down from the pampa to the coast towns where, in large numbers, they slept on the docks while waiting for the next steamer. The government offered free passage to all Chileans who wished to return to the farms of the south and to all Peruvians and Bolivians who cared to return to their respective countries. No such exodus had ever before been seen in the nitrate country (Conditions in Chilean Nitrate District, *Commerce Repts.*, Sept. 25, 1914, No. 225). The total number of unemployed in the nitrate plants and coast ports reached 33,000, half of whom were

heads of families, according to the report of the commission appointed to take care of the unemployed arriving at Iquique (*Commerce Repts.*, Dec. 9, 1914, No. 288). The significance of these figures arises from the fact that by far the larger part of the population in the whole country is dependent upon the 100,000 people directly engaged in nitrate production or trade. Furthermore, 58 per cent of the total customs revenues of the whole country are derived from the import and export duties of the nitrate region. In some years the export duties on nitrate have been not less than 85 per cent of the total national income (W. S. Tower: The Nitrate Fields of Chile, *Pop. Sci. Mo.*, Vol. 83, 1913, pp. 209-230. This is the best geographic article on the nitrate country yet published.) The export duties on nitrate and iodine normally produce $28,000,000 American gold. The government has for years maintained its employes and carried out improvements in other parts of Chile largely from revenues obtained from the nitrate region. As shown in Fig. 1, the production of nitrate steadily increased until the war broke out.

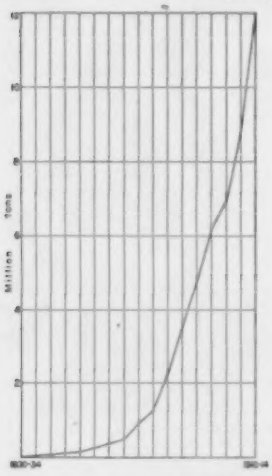


FIG. 1—The production of nitrate in Chile by five-year periods. Figures for 1830-1839 are from Paz Soldan: Geografia del Perú; for 1840-1894 from Ortúzar: Chile of To-day; for 1895-1914 from F. López Loayza: La Provincia de Tarapacá and from current numbers of *The South American Journal*.

The depression in the mining business has now been measurably overcome, owing to unprecedented prices for nitrates and copper and the huge sales of these products in 1916. The paper *peso* has advanced in value from 17½ cents to 22½ cents and the chronic annual deficit was changed in 1916 to an actual surplus (Prosperity in Chile, *Commerce Repts.*, March 20, 1917, No. 65).

Since Germany formerly took about 30 per cent of the nitrate exported, and since that country has probably developed economic methods for the extraction of nitrate from the air which will probably make her independent of Chilean nitrate, much attention has been given of late to the development of more economical business methods and to the extraction of a higher percentage of nitrate from the raw caliche (*Commerce Repts.*, Nov. 10, 1916, No. 10).

A New Determination of the Area of Peru. A new calculation of the area of Peru places the superficial extent of the country at approximately 534,000 square miles. This figure, obtained by measurement from Raimondi's map on the scale of 1:500,000, is a reduction of 20 per cent on that of 1876 carried out in a similar way (*Bol. Soc. Geog. de Lima*, Vol. 31, 1915, pp. 45-50). The principal loss of territory has been sustained in Loreto, the vast department of the eastern plains where Peru meets the republics of Colombia, Ecuador, Bolivia, and Brazil. Between Peru and the two latter countries boundary disputes were settled in the agreement of 1909 and since that time delimitation of the frontiers had been actively prosecuted. The work of the Peru-Bolivia Commission has been recently described by Colonel Holdich (*Geogr. Journ.*, Vol. 47, 1916). Boundaries between Peru and Colombia and Ecuador are still in dispute. Since 1879 Peru has also lost the nitrate province of Tarapacá. The above calculation, however, includes Tacna department with an area of 12,500 square miles.

AFRICA

Mineral Wealth of Katanga, Africa. Professor René d'Andrimont, in charge of geology at the Agricultural Institute of Belgium, has written a paper "Le Katanga et ses richesses minérales" (*La Nature*, No. 2255, 1916, Dec. 16, pp. 385-391), in which he concisely discusses not only the important metals, diamonds and coal of the southeastern part of the Belgian Congo but also their limited occurrence northward to the west of Lake Tanganyika. He says the metals are found especially in faulted areas, where the movement of metalliferous magmas to or towards the surface was facilitated. Copper, tin, gold, and diamonds were discovered in these zones of fracture. The most important gold deposits, however, have been found at Kilo, to the northwest of the great fracture-bordered graben filled by Lake Tanganyika, where gold to the amount of $2,000,000 has been mined in the past few years. No gold in paying quantities has yet been found in Katanga though there are many traces of it. Further search may be amply repaid, as in the case of the adjoining colony of Rhodesia.

The Ubamba depression, to the northwest of Elizabethville, is estimated by British and Belgian experts to contain tin worth $12,000,000. In a depressed area adjoining (Kundelungu), the English have found "pipes" containing diamonds as in the diamond mines of the Union of South Africa. Investigation is not yet so far advanced as to show whether diamond mining will be profitable. Copper is still the great mining industry of Katanga. The carbonate copper beds in the south are among the richest in the world, the mineral yielding from 12 to 14 per cent of metal. An adequate explanation of the very irregular distribution of these ores will not be found till the beds are known to their depths. Their upper part is in the form of sediments impregnated by carbonates.

Coal is the most recent discovery in Katanga. Two areas of coal have thus far been found. One of them is only six miles from the west coast of Lake Tanganyika on the line of the railroad connecting the lake with the Congo River and completed shortly before the war began. The four beds found there cover an area of some thirty square miles. This coal is now used on the Tanganyika steamers. The other coal find is in the region of Bukama which stands on the last navigable stretch of the upper Congo and is now being connected with Elizabethville by rail. This road will link the Congo with the great copper field that extends between Elizabethville and Kambove. CYRUS C. ADAMS.

Winds Over Northern Africa. In his presidential address before the Royal Meteorological Society, Major H. G. Lyons, F.R.S., considered the distribution of pressure and the air circulation over Northern Africa (*Quart. Journ. Roy. Met. Soc.*, Vol. 43, 1917, pp. 116-150). All of North Africa is arid. Some rain falls on the Mediterranean coast in winter, but south of the line Timbuktu-Lake Chad-El Obeid a fair amount of rain falls in July to September. The climatic characteristics of the region as a whole are high temperatures, large temperature ranges, low relative humidity, an almost cloudless summer, a moderate cloudiness in winter, and generally moderate wind velocities. These conditions extend in winter to 10° N., and in some places, as in the Egyptian Sudan, to 5° N. Major Lyons is of the opinion that the northerly and northeasterly winds of the French Sahara, and the northerly winds of the Nile Valley, may properly be called "trade winds" because they are maintained throughout the year as a steady circulation. They are not, however, to be regarded as convective currents forming part of a circulation between hotter and cooler regions, determined by such a difference of temperature. They are rather "geostrophic" winds, flowing around the Azores "center of action," whose influence extends to northeastern Africa in winter. In summer, the low pressure system of southern Asia maintains the northerly flow of air over Egypt and the surrounding region. R. DEC. WARD.

AUSTRALASIA AND OCEANIA

An Expedition to Easter Island and Its Results. Easter Island has long provided one of the most fascinating puzzles of the Pacific Seas. Towards the solution of its mysteries the Scoresby Routledge Expedition has made an important contribution. The expedition left England in 1913 and was absent three years, of which time about sixteen months were spent on the island. During this time supplies were secured from the Chilean mainland 2,000 miles distant.

From its discovery in 1722 by the Dutch navigator Roggeveen the isolated volcanic isle has been known for its strange megalithic statues (see The Voyage of Captain Don Felipe Gonzales to Easter Island 1770-1: Preceded by An Extract from the Official Log of Mynheer Jacob Roggeveen in 1722, *Hakluyt Soc. Publs.*, 2d Ser., No. 13, 1908). To the exposition of the culture they represent the work of the expedition was devoted. It embraced two fields—archeological and ethnological. The former included description and measurement of the great stone figures and a study of their distribution. The distribution is three-fold. They are related to the wrought stone terraces facing the shores; they are scattered on the volcanic slopes; and they line the quarry wherein all were fabricated. The statues that once stood on the terraces have all been overthrown, apparently in tribal war and within historical time. The statues on the slopes, also prostrate, appear to have bordered the roads leading from the quarry; on the longest road they must have been placed every few hundred yards apart for a distance of six miles. Most interesting are the statues in the quarry. In various stages of completion they number 150. The whole process of carving even to the number of workmen employed on them is clearly seen; and the tools, the harder obsidian scouring in the easily wrought volcanic ash, have been found. It is astonishing to learn that a figure could probably be completed in a fortnight. No hint as to the means of transportation, a much more arduous task than the carving, could be discovered.

From the ethnological point of view the last 50 years have been the most disastrous in the island's history. During the expansion of the Peruvian cotton industry in the early

sixties slave raiders from Peru carried off half of the native population, including the principal men. Today only 250 islanders exist. Since a Chilean company started ranching on the island they have been confined to a reservation. The raiders were immediately followed by Roman Catholic missionaries through whose efforts the old customs and traditions were prematurely curtailed. Knowledge of the stone statues and of the possibly related wooden images has practically disappeared. Detailed acquaintance with the wooden tablets bearing the unsolved hieroglyphic writing is fast vanishing, too. The old people, however, could remember the time in their youth when the writing was still a living part of their civilization but it was taboo to all the uninitiated and there now survives only one old man who had begun to learn the sacred art. One tradition remains in clear memory—the peculiar "bird-cult" that centred around the annual discovery of the first egg of the birds coming to nest on the island each spring.

From the surviving material the expedition appears to have secured practically all the data that the island can itself reveal. Further elucidation must be sought afield. In particular it is necessary to know more of the migrations in the Southern Seas whence rather than from the east the civilization of Easter Island seems to have come. Mrs. Scoresby Routledge's report of the expedition read before the Royal Geographical Society aroused much interesting discussion and in its published form (*Geogr. Journ.*, May, 1917) has prompted the appearance of other communications on the subject. Such is Notes on Easter Island by B. Glanvill Corney (*Geogr. Journ.*, July, 1917), in which is reviewed the account of Easter Island compiled by Paymaster Richards of the Challenger Expedition and contained in his manuscript diary.

Wind Direction Indicated by a Volcanic Cone. In their asymetrical contour the volcanic cones of Hawaii preserve a meteorological record in durable form. The typical elongation of the cones in a northeast to southwest direction bears witness to the steady prevalence of the northeast trade wind. Material in the process of ejection is naturally deflected to the leeward of the growing cone and its symmetry thereby destroyed. An exception to this general phenomenon is to be found in the Punchbowl, an old crater hill lying in the heart of Honolulu. The configuration of the Punchbowl indicates that during its formation the dominant wind blew from the southeast. Such a wind, named the "Kona," blows erratically at infrequent intervals mainly during the rainy season. It is believed that the Punchbowl was built up in a single rapid explosion probably lasting a few hours only. (Vaughan MacCaughey: The Punchbowl: Honolulu's Metropolitan Volcano, *Sci. Monthly*, June, 1916, pp. 607-613.)

The 1916 Census of Population in New Zealand. Some preliminary results of the 1916 population census of New Zealand are published in the Official Year-Book of that date. The population, exclusive of the Maoris and the residents of the Pacific islands annexed in 1901, is 1,099,044, representing a population density of between 10 and 11 to the square mile. To this the major divisions contribute unequally. North Island has 14.5 to the square mile, South Island 7.5. While the area of occupied pastoral land is far greater in South Island than in North Island the land under cultivation in the latter is nearly twice as great as in the former. In comparison with figures of the two preceding quinquennial periods the increase from 1911 to 1916 shows a marked drop, being about 9 per cent as compared with increases of 15 per cent from 1901 to 1906 and 13.5 from 1906 to 1911. The decline is accounted for by the curtailment of emigration since the beginning of the war and the withdrawal of troops for over-seas service. In 1913 the net gain of arrivals over departures amounted to more than 14,000; in 1915 it was reduced to 3,000.

PHYSICAL GEOGRAPHY

Frequency Curves of Climatic Phenomena. Successful agricultural practice requires a knowledge of the frequency of occurrence of unfavorable weather phenomena. Mean values, even single absolute extreme values, are obviously not satisfactory. H. R. Tolley, of the Office of Farm Management in Washington, has recently been giving special attention to this subject, and has brought out some results which are of immediate and practical use (Frequency Curves of Climatic Phenomena, *Monthly Weather Rev.*, Vol. 44, Nov., 1916, pp. 634-642). Normal frequency curves have been plotted for the date of last killing frost in spring (33 stations, 823 observations) and for annual rainfall (21 stations, 963 observations). The development of such diagrams, and the determination of the normal frequency curves, involves much labor and a certain mathematical ability, but there is no question about the practical importance of the results. A number of other frequency curves, and the numerical and mathematical data used in the computations, are included.

R. DEC. WARD.

Climatic Factors in Plant Life. As agriculture comes to depend more and more upon refined studies of climatic factors, empirical and wasteful experiment is rendered unnecessary. Some of the results of studies now under way are striking in their real practical importance. For example southern Ontario grows tobacco and grapes. Where else in Canada may equivalent climatic conditions be met? Not as might be supposed in merely "milder" regions. Victoria, British Columbia, has a longer period of active growth (268 days against 216 in Toronto), a longer frostless period (233 days against Toronto's 165), a slightly greater total of "heat units" for the year, and a much smaller sum of "cold units." But Victoria has only four days of "tropical heat" to Toronto's 45 and a smaller number of heat units during the growing season. By days of "tropical heat" is meant days with mean temperature over 68° F. Active growth is considered to begin at temperatures of 41° F. or over. The terms "heat units" and "cold units" are used to describe total temperature effects. The heat unit is defined as a temperature of 1° F. above the freezing point continued for the duration of an hour; the cold unit is a similar measure below the freezing point. These and other temperature elements are set forth in a paper by J. Adams (The Quantitative Study of Climatic Factors in Relation to Plant Life, *Trans. Roy. Soc. of Canada, Section 9, Geol. and Biol. Sci.*, Ser. 3, Vol. 10, 1916, pp. 105-123). Besides the temperature factor the author also makes analyses of light, precipitation, evaporation and wind in relation to plant life. In particular he emphasizes the value of evaporation, the most significant factor that can be readily measured.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

South Atlantic States

MATSON, G. C., AND SAMUEL SANFORD. **Geology and ground waters of Florida.** 445 pp.; maps, diagrs., ills., index. *U. S. Geol. Survey Water-Supply Paper 319.* Washington, D. C., 1914.

Nearly half of this volume is a sketch of the topography, hydrography, shore lines, and stratigraphy of Florida, being a revision of a similar work by Matson, Clapp, and Sanford published four years earlier in the Second Annual Report of the Florida Geological Survey. The remainder is devoted primarily to hydrology and includes notes on the topography, geology, and underground waters of the several counties, with about four pages on each one. Wherever the treatment of topography and geology differs from that in the Florida geological report it is usually as a result of additional field work by Mr. Matson in the winters of 1909-1911 and by Dr. T. W. Vaughan. Mr. Sanford's work was in the southern half of the peninsula and was all done prior to the earlier publication. The water resources of most of the counties had been described previously, with more topographic details, by Sellards and Gunter in the 3d, 4th and 5th annual reports of the Florida survey, but these reports seem to be ignored in the present publication. Of the 28 half-tone illustrations, nine seem to be from photographs previously used in the Florida second annual report, and two were published in 1912 in *Geological Survey of Georgia Bulletin 26* (reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 920-923). The large geological map of the state is very similar to that used in the state report four years earlier, but the small colored map showing supposed Pleistocene terraces is entirely new.

Part 1, with 44 pages, entitled "geography," is mostly devoted to topography; and Matson describes northern and central Florida and Sanford southern Florida. Matson divides the state into only three topographic provinces: the upland or lake region, the lowlands, and the coast. The first has a maximum altitude of only about 300 feet, but is very diversified nevertheless; and the contour map of a small area selected to illustrate its topography does not belong to the true peninsular lake region (mapped by the reviewer in the 3d annual report of the state survey, January, 1911) at all, but represents a very typical portion of the lime-sink region. The lake region seems to taper northward into a long narrow ridge parallel to the Atlantic coast, known as Trail Ridge, which is mentioned a few times in this report, but without any attempt to explain it (see *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, p. 922). The effects of erosion are perceptible in the northern, and particularly the northwestern, part of the state, but not conspicuous in the peninsula, where streams are scarce and sluggish, and solution and wind work seem to have been more potent.

The lowland area corresponds approximately with that part below the 100-foot contour and is now regarded by Matson as being divisible into three Pleistocene terraces (which are shown on one of the folded maps). Such terraces were traced in the coastal plain of Maryland some years ago (see Maryland Geological Survey report on Pliocene and Pleistocene, by G. B. Shattuck and others, 1907), but the extension of the terrace hypothesis to Florida is something new. There is scarcely a hint of it in Matson's contribution to the Second Annual Report, published at the beginning of 1910, or in Vaughan's important "Contribution to the Geologic History of the Floridian Plateau," published nearly a year later (*Carnegie Inst. Publ. 133*, 1910, pp. 99-185; abstracted in *Science* for July 1, 1910). The evidence in favor of terraces is not given very fully in the report under consideration, but it is to be hoped that a more complete discussion will be supplied in the near future. Until then perhaps it will be best not to

attempt to judge of its correctness; but it may be observed here that if the existence of such terraces, and their geographical significance, can be satisfactorily demonstrated, it will call for profound modifications in the system of geographical divisions of Florida outlined by the undersigned in the 3d and 6th annual reports.

About four pages in Matson's part of the report are devoted to the diverse features of the coast and the work of waves, tides, shore currents, and corals. A three-page section on soils has little connection with the rest of the work. The growth of pineapples on old dunes near Fort Pierce is cited as "a striking example of the productivity of a sandy soil properly tilled"; but in that case the soil is nearly pure silica and serves merely to anchor the roots, and its apparent productivity is due to the use of commercial fertilizer at the rate of over $30 per acre per year! (For any other crop than pineapples probably much more fertilizer would be required.) The advantage of using lime on some Florida soils is briefly mentioned, but there is no intimation that the average Florida soil is more deficient in potassium than in any other essential element (and more so than that of any other state; presumably because the peninsula is remote from all igneous rocks and from streams traversing such rocks, and most of its strata are of organic sediments).

Sanford's contribution of 23 pages on southern Florida does not differ much from the corresponding part of the Second Annual Report. Although that part of the state is very low, it is considerably diversified, and among its features are described dunes, rolling sand plains, flat lands, rock ridges, the Everglades, cypress swamps, mangrove swamps, keys, and shore lines. The dunes are mostly on the east coast, and most of them are stationary and well covered with vegetation. One near Hobe Sound rises to 63 feet above sea-level. As a rule the old dunes of the east coast stand a little back from the coastal lagoons and a mile or two from the present ocean beach. Sanford regards them as having been formed when the land stood at least ten feet higher above the sea, and thus as indicating a subsidence of that amount since the Pleistocene. (He has recently reiterated that belief in *Science*, Vol. 43, 1916, March 10, pp. 348-349.) But to the reviewer the facts indicate nothing of the sort, and perhaps just the opposite. For active dunes in humid climates, in the eastern United States at least, seem to occur only within half a mile or so of wave-washed sandy beaches, of lakes or oceans; and the fact that the fixed dunes of Florida average a mile or two from the present coast seems to indicate a seaward movement of the shore line, by elevation or otherwise, since they were formed. (It is difficult to imagine how any sinking of the land could diminish the force of the wind on active dunes and allow them to become overgrown with forests.)

Sanford's description of the Everglades covers five pages, and when first published, early in 1910, it was probably the most complete and accurate there was. The tall mangrove forests of the Ten Thousand Islands, unlike the bushy mangrove swamps of the east coast, are probably known to but few botanists. The fact that the Keys form two groups (separated by Bahia Honda Channel), differing considerably in geology, topography, and vegetation, was probably almost unknown when Sanford first published his description (see *Bull. Amer. Geogr. Soc.*, Vol. 44, 1912, p. 521). Those of the upper or northeastern group are formed of recent coral rock, while the lower or western keys are of Pleistocene oölite, much like that on the mainland around Miami.

The geological details of the report need not be dwelt on here. Suffice it to say that the underlying strata described are mostly limestone, ranging in age from Upper Eocene or Lower Oligocene to Recent, and the surface is mostly covered with sand, which may be partly residual and partly a comparatively recent deposit. In the discussion of probable recent changes of sea-level along the coast there is no mention of Dr. D. W. Johnson's observations on the subject, some of which were published a year or two before. On page 102 there is a curious error, repeated from the Second Annual Report. It is there stated that W. C. Kerr and Elisha Mitchell visited Tampa in 1884. Dr. Mitchell died in 1857, and probably never knew Kerr or saw Florida!

There is much less correspondence between the geological divisions shown on the large map and easily recognized geographical divisions than one finds in the other southeastern states, but with the increase of knowledge the discrepancies will probably diminish. The mapping of the coastward portion of the Gulf hammock region, from Jefferson County to Hernando County, as Pleistocene and Recent seems ill-advised, for outcrops of Tertiary limestone just like those a little farther inland abound in the strip thus mapped and even on the bottom of the Gulf of Mexico near by, as was noted by Col. J. L. Williams in his "Territory of Florida" in 1837. The limestone even forms a few natural bridges in the southern part of Jefferson County.

Like its predecessor in the state geological report, the geological map shows topography by means of contours (with a 50-foot interval), and remarkably well considering the thinly settled condition of the state and the fact that not 10 per cent of it is yet covered by topographic surveys.

From the section devoted to underground water the reader can learn that Florida is noted for its large limestone springs (one of which is probably the largest spring in the world). Flowing artesian wells are fairly common in the eastern half of the peninsula and near the west coast, and some of those in Brevard County have a static head of about 50 feet. The water in some of the deep wells in Volusia, Brevard, and Osceola Counties and in all hitherto drilled at Key West is rather salty. In this part of the report there seems to be nothing about the temperature of the air or the predominance of summer rains in all parts of the state; matters which naturally have some bearing on the distribution and depth of ground water.

A few errors and omissions in the county descriptions may be noted here, with the pages on which they occur.

263. Alachua County is not in the lake region, except perhaps a narrow strip at its eastern edge.

269. The highest point mentioned on Trail Ridge is 210 feet. Elevations of about 238 feet a few miles farther south were reported in the *American Journal of Science* (Vol. 67, p. 408) in 1854, and in *U. S. Geological Survey Bulletin 516* (p. 17) in 1912 (see *6th Ann. Rept. Fla. Geol. Survey*, 1914, p. 329, footnote).

287. The water of Ichetucknee Spring is described as amber-colored. The reviewer pointed out in the 3d annual report of the Florida survey (p. 284) at the beginning of 1911 that that can hardly be its normal condition.

342, 343. "Big" Spring near Okahumpka should be Bugg Spring.

The names of Lake Okeechobee, Okefinokee Swamp, Ocklocknee River, Hillsborough Inlet, Hillsborough River, and St. John's County are spelled differently from local usage and therefore presumably wrong; but curiously enough, Hillsborough County and St. John's River are spelled correctly throughout (except for omitting the apostrophe from the latter, which is not a serious error).

Plate 3A is from a photograph taken by the reviewer on July 22, 1910, but there is no mention of that fact, or that the sink-hole there depicted was less than two days old at the time. Plate 4A is entitled "Sink of Santa Fe River," but it is really the "rise," where that river emerges from its subterranean course, and it is correctly labeled in the Second Annual Report. It is not quite so much out of plumb in the later publication, however. Plate 11B seems to be upside down. The "sandstone of uncertain age" in plate 12A seems to be identical with the Altamaha grit of Georgia, as was pointed out by the reviewer in 1911 (*Torreya*, Vol. 11, 1911, April, p. 95. See also *6th Ann. Rept. Fla. Geol. Survey*, 1914, p. 201).

There is no separate bibliography, but nearly one hundred earlier papers are referred to in footnotes or otherwise. Over one-third of these belong to the decade immediately preceding the publication of the authors' first report on Florida geology, four years earlier, but only five or six fall between the two reports. This last probably indicates that a considerable time elapsed between the writing and printing of the one under consideration.

ROLAND M. HARPER.

ANDREWS, D. M. **De Soto's route from Confitachequi, in Georgia, to Cosa, in Alabama.** Maps, bibliogr. *American Anthropologist*, Vol. 19, 1917, No. 1, pp. 55-67.

BOUCHER, C. S. **The ante-bellum attitude of South Carolina towards manufacturing and agriculture.** *Washington University Studies*, Vol. 3, 1916, Part 2, No. 2, pp. 243-270.

DIXON, H. M., AND H. W. HAWTHORNE. **An economic study of farming in Sumter County, Georgia.** 64 pp.; diagrs. *U. S. Dept. of Agric. Bull. No. 492.* Washington, D. C., 1917. [This bulletin is a report on an exhaustive study of farming in a representative county in the cotton belt.]

GELDERT, L. N., edit. **Facts about Georgia: A state rich in resources and opulent in opportunities.** 277 pp.; maps, ills., index. Foote & Davies Co., Atlanta, 1916. $1.00. 10½ x 8. [A popular account of the State's resources written by various authorities and containing a large amount of information of geographical importance. The sections of chief interest are "Forest Resources of Georgia," "Mineral Resources," "Altitudes, Population, and Farm Ownership," and "Cotton."]

LANGFITT, WM. C. **Progress of inland waterways in Savannah district.** *Rept. of Proc. of the Eighth Ann. Convention of the Atlantic Deeper Waterways Assoc.*, pp. 177-182. Philadelphia, 1915.

MARSHALL, R. B. **Spirit leveling in North Carolina, 1896 to 1914, inclusive.** 71 pp.; index. *U. S. Geol. Survey Bull. 646.* Washington, D. C., 1916.

SOUTH AMERICA

PARAGUAY, URUGUAY, ARGENTINA, CHILE

MARTINEZ, A. B., AND MAURICE LEWANDOWSKI. **Argentinien im zwangstigsten Jahrhundert.** Nach der vierten Auflage des französischen Originals übersetzt von Frank Kars. xlviii and 354 pp.; maps. F. A. Perthes, Gotha, 1912. Mk. 8. 9 x 6.

It appears that about 1910 England had 935 million dollars invested in the Argentine Republic, France 390, and Germany 200. On account of the close sympathy between the Republic and France, it was desired to attract larger French investments. The present book was written to present the attractiveness of the Argentine to Frenchmen with capital. It was originally written in French. The authors are an Argentine official and statesman and Dr. Maurice Lewandowski, who is stated to have been sent out to study the situation as the representative of the Comptoir National d'Escompte of Paris. They report huge and continuous increases of crops as well as areas put under crops, continued increase of animals of all sorts except sheep, which demand too much space and have therefore to yield to the demand for agricultural land, and continued increase of population and prosperity. Half of the Argentine territory, they say, can be made to serve for grazing or stock raising in about equal proportions, and the country can and certainly will greatly increase its population and its production of grains, alfalfa and live stock. But they also report that the immigrant does not remain in the country, as he should for its best interest; too often he returns to Europe after each harvest, because the land is not made easy enough of acquisition. Slow, vexatious, and difficult is the purchase of land by the poor man. This is a serious drawback to the expansion of Argentine agriculture. Education has a long road to go before it reaches a proper status, a status that will enable the Argentine citizen to look level-eyed at the citizen of the United States. The nation is too much a borrower, too little a saver. Surpluses are too often flung into further expansion instead of being devoted to consolidating what has been gained. National expenditures are altogether too large. Speculation, chiefly in land, reaches ever dizzier heights, yet it is founded on substantial values. Even the highest sales-figures quoted rarely reach forty or fifty dollars an acre. The reviewer recalls the old assessment of "camp" lands about Cordoba in 1884 at $400 the league of *nine square miles*, and how excessive seemed the increase to $12,000 the league when water became available for it in the Rio Primero works. Yet the new price is but two dollars an acre!

The investigations of these authors are doubtless sound economically and financially, but in no geographic sense scientific. The real basis for judging the availability of Argentine lands is the local rainfall, of which the book takes no account. A single page covers the whole account of rainfall: "the rain has no constant character," p. 26. Doubtless because this important matter is ignored, the portion of the republic that may raise crops or stock is put too high. MARK JEFFERSON.

LEHMANN-NITSCHE, ROBERT. **El problema indígena: Necesidad de destinar territorios reservados á los indígenas de Patagonia, Tierra del Fuego y Chaco según el proceder de los Estados Unidos de Norte América.** *Anal. de la Soc. Científica Argentina*, Vol. 80, 1915, No. 5-7, pp. 385-389. [Paper read at the Pan-American Scientific Congress of Buenos Aires in 1910.]

MATTA, J. G. **Bosquejo del estado actual de la industria minera del cobre en el estranjero i en Chile.** 130 pp. Soc. Nacl. de Minería, Santiago de Chile, 1915.

MOLLO, ANTONIO. **L'Argentina nella crisi economica mondiale.** *Italica Gens*, Vol. 6, 1915, pp. 89-94. Torino.

ORMEZZANO, VINCENZO. **Antofagasta.** *La Geogr.*, Vol. 4, 1916, No. 4-7, pp. 164-186. Novara.

OSSA, I. D. **Depósito de molibdeno i tungsteno de Campanani, Arica.** *Bol. Soc. Nacl. de Minería*, No. 223, Vol. 28, 1916, Ser. 3a, pp. 202-213.

RASSMUSS, J. **Rasgos geológicos generales de las sierras pampeanas.** 18 pp. *Bol. Direcc. Gen. de Minas, Geol., e Hidrol.*, Minist. de Agric., No. 13, Ser. B (Geol.). Buenos Aires, 1916.

SCHULTZ, L. G. **Resultado de las observaciones del magnetismo terrestre.** 12 pp.; maps. *Bol. Oficina Meteorol. Argentina No. 5.* Buenos Aires, 1914.

SINGEWALD, J. T., JR., AND B. L. MILLER. **The genesis of the Chilean nitrate deposits.** Bibliogr. *Econ. Geology*, Vol. 11, 1916, No. 2, pp. 103-114. [Abstracted in the December, 1916, *Review*, Vol. 2, p. 465.]

STONE, J. P. **The Chilean nitrate industry.** Ills. *The South American.* Vol. 5, 1916, No. 1, pp. 12-13 and 19.

SWAN, A. D. **Some ports on the west coast of South America and their future development.** *Papers of the Amer. Assoc. of Port Authorities*, Vol. 5, 1916, Part 1, pp. 31-40. [The author has prepared plans for the development of the North Chilean ports of Antofagasta, Coloso, and Mejillones. On his approved plans Antofagasta will remain the principal shipping port despite the vastly superior natural harbor of Mejillones. Besides the consideration of the present status of Antofagasta "it must be borne in mind that, in order to get to Mejillones from the interior by rail with a reasonable gradient, it [freight] would have to be taken past Antofagasta, a distance of 69 kilometers."]

THIERRY, MAURICIO DE. **Ensayo de clasificacion de las aguas minerales de la República Argentina.** *Anal. del Minist. de Agric.*, Vol. 10, 1915, No. 3, pp. 1-150.

—— **Uruguay, The mineral resources of.** *South American Journ.*, Vol. 80, 1916, No. 19, p. 382; No. 22, p. 445.

VEGA GALLO, HERMÓJENES. **Reseña sobre los trabajos en el mineral de El Tofo.** *Bol. Soc. Nacl. de Minería No. 219*, Vol. 27, 1915, Ser. 3a, pp. 434-439. Santiago de Chile. [Mine near Coquimbo, Chile.]

WILLIS, BAILEY. **The awakening of Argentina and Chile.** Ills. *Natl. Geogr. Mag.*, Vol. 30, 1916, No. 2, pp. 121-142.

—— ***Beagle Channel: Cape San Pio to Gable Island.*** 1:75,000. *U. S. Hydrogr. Office Chart No. 2207.* Washington, D. C., July, 1916.

—— ***Beagle Channel: Gable Island to Lapataia Bay.*** 1:75,000. *U. S. Hydrogr. Office Chart No. 2208.* Washington, D. C., July, 1916.

—— ***Guaitecas Islands. From a Chilean survey in 1904.*** 1:100,000. *U. S. Hydrogr. Office Chart No. 2389.* Washington, D. C., July, 1916.

—— ***Guapiquilan Islands (off the south coast of Chiloé). From a Chilean survey in 1896.*** 1:41,000. *U. S. Hydrogr. Office Chart No. 1747.* Washington, D. C., July, 1916.

—— ***Papudo Bay. From a Chilean survey in 1901.*** 1:29,000. *U. S. Hydrogr. Office Chart No. 2227.* Washington, D. C., July, 1916.

—— ***Paraná and Uruguay Rivers, Entrance to the. From Argentine surveys between 1901 and 1910.*** 1:100,000. *U. S. Hydrogr. Office Chart No. 2704.* Washington, D. C., July, 1916.

—— ***Paraná River: Caalayti Sand to Corrientes. From a British survey in 1847.*** 1:85,000. *U. S. Hydrogr. Office Chart No. 2710.* Washington, D. C., July, 1916.

—— ***Paraná River: Paraná to Caalayti Sand. From a British survey in 1847.*** 1:84,900. *U. S. Hydrogr. Office Chart No. 2709.* Washington, D. C., July, 1916.

—— ***Paraná River: Paraná Guazu to Ceibal. From Argentine surveys between 1901 and 1910.*** 1:100,000. *U. S. Hydrogr. Office Charts No. 2707 and 2708.* Washington, D. C., July, 1916.

—— ***Punta Arenas Road. From a Chilean survey in 1897.*** 1:25,600. *U. S. Hydrogr. Office Chart No. 2081.* Washington, D. C., July, 1916.

—— ***Quilan Cove. From a Chilean survey in 1896.*** 1:10,000. *U. S. Hydrogr. Office Chart No. 1747.* Washington, D. C., July, 1916.

—— ***Taltal, Port. From a Chilean survey in 1903.*** 1:11,800. *U. S. Hydrogr. Office Chart No. 2334.* Washington, D. C., July 7, 1916.

—— ***Uruguay River: Concepcion del Uruguay to Concordia. From Argentine surveys between 1901 and 1910.*** 1:50,000. *U. S. Hydrogr. Office Chart No. 2706.* Washington, D. C., July, 1916.

—— ***Zapallar, Port. From a Chilean survey in 1901.*** 1:29,000. *U. S. Hydrogr. Office Chart No. 2227.* Washington, D. C., July, 1916.

EUROPE

BRITISH ISLES

STEBBING, E. P. **British forestry: Its present position and outlook after the war.** xxv and 257 pp.; ills., index. John Murray, London, 1916. 6s. 8 x 5.

The problem of finding an adequate and marketable supply of timber for house-building on a vast scale after the war has engaged the attention of this well-known authority in forestry. A strong afforestation policy should be adopted. For immediate purposes Russian forests offer the strongest hope. From a geographer's viewpoint the most valuable chapters deal with the forests of Russia in Europe and the forests of Finland, Siberia,

and Turkestan. These chapters contain sections on the topography, climate, forest resources, exports, and imports of each region with reliable statistics. A short chapter on the cedar trade of Asiatic Russia contains invaluable material on the gathering of the seed of the cembran pine, material which the geographer would find it exceedingly difficult to get elsewhere. Certainly nowhere else can be found so careful and comprehensive an exposition of the timber imports and exports of the British Isles in 1915. Professor Stebbing's book not only serves the immediate needs and emergencies of the time but also contributes to a broader knowledge of the principles and economics of forestry, the crop aspects of the world's timber supply, and the place of trees in the new commercial and social age to follow the present war.

BONACINA, L. C. W. **The great snowstorms of 1916.** *Symons's Meteorol. Mag.*, No. 603, Vol. 51, 1916, April, pp. 37-40.

—— **British Isles, The.** viii and 210 pp.; maps, diagrs., ills. (Cambridge Geographical Readers, III. Edit. by G. F. Bosworth.) University Press, Cambridge, 1915.

—— **British rainfall, 1915.** By Dr. H. R. Mill and Carle Salter. *Nature*, No. 2453, Vol. 98, 1916, Nov. 2, p. 168. [A review.]

CARMICHAEL, ALEXANDER. **Grazing and agrestic customs of the outer Hebrides.** *Celtic Rev.*, No. 37, Vol. 10, 1914, pp. 40-54; No. 38, 1915, pp. 144-148. [Description of archaic customs surviving amongst the crofters of the Outer Isles. Arable lands and peat mosses are re-distributed periodically according to lot. Each season the fishing grounds are apportioned in the same way. Certain obligations incurred by the crofters themselves, i. e. the wages of the constable elected, are paid in kind. Each community (townland) has its own shepherd and herdsman. Many of the ancient customs, however, are now disappearing.]

CHAPMAN, E. H. **The relation between atmospheric pressure and rainfall at Kew and Valencia observatories.** Diagrs. *Quart. Journ. Roy. Meteorol. Soc.*, No. 180, Vol. 42, 1916, pp. 289-299. [The Valencia referred to here is in Ireland not Spain.]

CLARK, KEITH. **The spell of Scotland.** 345 pp.; map, ills., bibliogr., index. The Page Co., Boston, 1916. $2.50. 8 x 6.

CLOSE, C. F. **Notes on the geodesy of the British Isles.** 33 pp., maps, index, bibliogr. *Ordnance Survey, Prof. Papers, New Series, No. 3.* London, 1914.

DEELEY, R. M. **The fluvio-glacial gravels of the Thames Valley.** Map, diagr. *Geol. Magazine*, Sixth Decade, Vol. 3, 1916, No. 2, pp. 57-64; No. 3, pp. 111-117.

SHAW, NAPIER. **Hourly values from autographic records: Geophysical section, 1913. Comprising hourly readings of terrestrial magnetism at Eskdale Observatory and summaries of the results obtained in terrestrial magnetism, meteorology, and atmospheric electricity chiefly by means of self-recording instruments at the observatories of the meteorological office.** 97 pp.; diagrs. *British Meteorol. and Magnetic Year Book, 1913*, Part 4, Sect. 2. Edinburgh, 1915.

WARD, E. M. **The Cinque Ports and their coastline.** Maps, bibliogr. *Geogr. Teacher*, No. 45, Vol. 8, 1916, Part 5, pp. 306-311; No. 46, Part 6, pp. 360-374.

THE LOW COUNTRIES, LUXEMBURG

LÖHNIS, TH. P. **De Maatschappij voor Scheeps- en Werktuigbouw "Fijenoord" te Rotterdam, voorheen de Nederlandsche Stoomboot-Maatschappij.** Ills. *Tijdschr. voor Econ. Geogr.*, Vol. 7, 1916, No. 4, pp. 133-156.

LOON, H. W. VAN. **The rise of the Dutch kingdom, 1795-1813: A short account of the early development of the modern kingdom of the Netherlands.** xx and 279 pp.; ills. Doubleday, Page & Co., New York, 1915. $2.50. 9 x 6.

PIRENNE, H. **De Belgische natie.** *Vragen van den Dag*, Vol. 31, 1916, No. 10, pp. 737-757.

SCHRIJNEN, JOS. **Nederlandsche Volkskunde, Vol. 2.** iv and 361 pp.; map, ills., index. W. J. Thieme & Cie., Zutphen. Fls. 3.75. 10½ x 7.

VAN DER STOK, J. P. **Bijdrage tot de kennis van het klimaat van Nederland.** Diagrs. *Tijdschr. Kon. Nederl. Aardrijk. Genoot.*, Vol. 33, 1916, No. 1, pp. 1-29; No. 2, pp. 163-190.

WIEDER, F. C. **Mijn eerste onderzoek in Duitschland naar oud-Nederlandsche kaarten en een belangrijke vondst in Engeland.** *Tijdschr. Kon. Nederl. Aardrijk. Genoot.*, Vol. 33, 1916, No. 4, pp. 540-568.

SCANDINAVIA, INCLUDING FINLAND

MADSEN, V. H. O. **Le Service Géodésique du Danemark, 1816-1916.** 46 pp.; maps, ills. *Den danske Gradmaaling No. 16.* Copenhagen, 1916.

General Madsen, Director of the Geodetic Survey of Denmark, has celebrated the centenary of that organization by publishing a brief résumé of geodetic accomplishments in Denmark, together with portraits and succinct biographies of his three eminent predecessors and five maps illustrating the work accomplished.

Except for the first director and a few of the collaborators, all the directors, observers, and calculators have been officers of the army or navy. Denmark joined the International Geodetic Union in 1862 and has made an appreciable contribution to the solution of problems of international interest.

Triangulation had begun in 1765, but systematic work dates from the founding of the Danish Geodetic Service in 1816 under Professor Schumacher, who established the observatory of Altona. Director Schumacher's equipment and work attracted world-wide notice, many celebrated astronomers coming to Holstein to visit him. He inaugurated a grand program of triangulation to cover Denmark and join with Prussia, but his labors were interrupted in 1848 before his program was completed. He originated the *Astronomische Nachrichten* in 1823.

Colonel Andrae resumed operations in 1853 and completed the program in 1884, publishing his results in Volumes 1-4 of *Den danske Gradmaaling.* This completed Denmark's contribution to the determination of the terrestrial spheroid. Andrae's elaboration of his predecessor's observations and his originality in developing geodetic theories along practical lines won him international renown.

Under General Zachariae, 1884-1907, a new program of work began, including precise leveling, latitude and gravity determinations, and an extension of the triangulation net to join with Sweden. He practically finished his program and published his results in Volumes 5-9, but military service prevented him from completing his calculations.

General Madsen was appointed in 1907. He continued practical work, introducing many modern improvements in methods, and in 1912 published as Volume 10 a résumé in French of the first nine volumes. A review of Volume 10 has already appeared (*Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 713-714). JAMES GORDON STEESE.

SANDSTRÖM, J. W. **Meteorologische Studien im schwedischen Hochgebirge.** 48 pp.; maps, diagrs. Wettergren & Kerber, Göteborg, 1916. 9½ x 7.

J. W. Sandström has been making personal studies of meteorological phenomena in the mountains of Sweden. This "field work," as is always the case when it is undertaken by a competent observer, has yielded many interesting facts.

The trip, the results of which are now published, was a short one (December 3, 1913–January 20, 1914). The succession of weather changes met with during the author's tramp through his native mountains is graphically described. The most noteworthy phenomena are analyzed and explained. Local winds, snow squalls, temperature changes, ice conditions, cloud formation, fog—these and many other meteorological conditions are referred to. The author says that there must be few districts in the world better suited for direct observation of dynamic meteorological phenomena than the west side of the northern Scandinavian highland in winter. The most important aids in his work were his "own eyes and feet." Special attention is given to the air movements in the mountains, and several diagrams illustrate the conditions. A few closing paragraphs deal with geological climates. The essential importance of wind in controlling cloudiness and precipitation and in determining life conditions is strongly emphasized, and the controls exercised by topography over air movement and temperature are considered. Geological climates are believed to have been directly controlled by the relief of the earth's surface. When the mountains were highest, glacial climates prevailed. When the mountains were lowered by erosion, warm desert climates prevailed. Variations in the CO_2 content of the atmosphere, depending upon the temperature of the ocean waters, were contributing causes of climatic change. Storms, also, being more violent when the mountains were highest, brought more precipitation at times of most marked relief.

Dr. Sandström's discussion of geological climates is unfortunately very brief. His views upon this subject are clearly affected by what he has himself seen of present conditions of air movement in its relation to topography in Sweden. It would be well if more writers were to start with *present* conditions in their endeavor to explain past climates. R. DEC. WARD.

—— **Allmänna Väg- och Vattenbyggnader, av Kungl. Väg- och Vattenbyggnadsstyrelsen. År 1915.** viii and 153 pp. Sveriges Officiella Statistik, Stockholm, 1916.

BIRRELL, J. H. **Notes on Sweden, with special reference to the forests in relation to industry and commerce.** Map. *Scottish Geogr. Mag.*, Vol. 32, 1916, No. 5, pp. 227-241.

—— **Electric energy, the transmission of, from Sweden to Denmark.** Maps, *Scientific American Suppl.*, No. 2110, Vol. 81, 1916, June 10, p. 377. [An abstract from *Engineering*, giving various technical details of "the first instance of the transmission of electric power from one country to another by submarine cables." The current is transmitted from Helsingborg to Elsinore.]

—— **Finland, Statistisk Årsbok för.** 669 pp.; map. *Utgifven of Statistiska Centralbyrån*, New Ser., Vol. 13, 1915. Helsingfors, 1916. [Also written in French.]

—— **Järnvägar, Statens, av Kungl. Järnvägsstyrelsen, År 1915.** 246 pp.; maps, diagrs. Sveriges Officiella Statistik, Stockholm, 1916.

LINDROTH, HJALMAR. **Estnisk bosättning i Sverige under äldre tider.** Map. *Ymer*, Vol. 36, 1916, No. 3, pp. 194-214. [Esthonians in Sweden in ancient times.]

—— **Nedbøriagttagelser i Norge.** Vol. 21, 1915. xi and 83 and 66 pp.; maps, diagrs., ills. Norske Meteorol. Inst., Christiania, 1916. [Rainfall observations in Norway.]

RABOT, CHARLES. **Le grand lac Vener accessible à la navigation maritime.** Map, diagr. *La Nature*, No. 2271, 1917, April 7, pp. 220-222. [Illustrated with a map and profile of the canal. Compare the record item entitled "Extension of the Swedish Waterway System" in the March number of the *Review*, p. 243.]

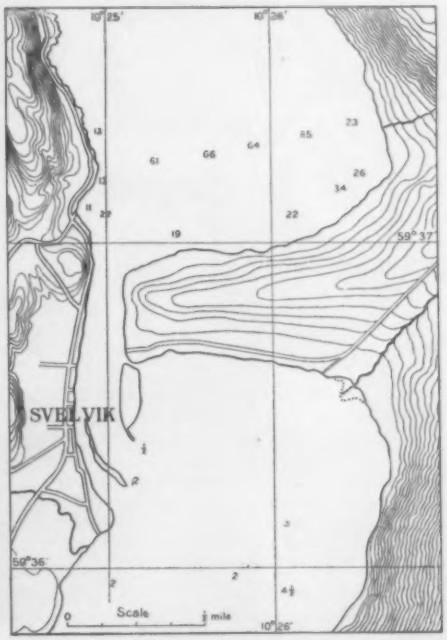
ROSEN, ERIC VON. **Hafva offerplatserna vid Gråträsk, Rautasjaure, och Unna Saivva uteslutande användts af lappar?** *Ymer*, Vol. 36, 1916, No. 1, pp. 32-38. [As to whether certain sacrificial places were used exclusively by Laplanders.]

RYDER, C. **Meteorologisk Aarbog, 1914. Part II: Faerøerne, Island, Grønland og Vestindien.** 85 pp. **1915, Part I: Kongeriget Danmark.** 75 pp. Danske Meteorol. Inst., Coppenhagen, 1916.

SANDER, G. D. **Zeemansgidsen voor de Kleine Vaart. Part 4: De Bothnische Golf.** 160 pp.; diagrs., ills., index. Dept. of Agric., 's-Gravenhage, 1914.

—— **Swedish lake, Ship canal from, to ocean.** Ills. *Engineering News*, Vol. 77, 1917, Feb. 22, pp. 297-298. [Abstracted in the March *Review*, p. 243.]

—— ***Topografisk kart over kongeriket Norge.*** Sheet: ***Moss.*** 1:100 000. Surveyed in 1891-1908, revised in 1912. Norges Geografiske Opmaaling 1915, Christiania, 1915. [A portion of the Christiania fiord district showing excellent examples of partially submerged glacial troughs and small hanging valleys, and especially noteworthy for the prominent terminal moraine near Svelvik which separates Dram Fiord into two parts. For a good description of the moraine, illustrated by photographs and diagrams, see W. C. Brøgger: "Om de senglaciale og postglaciale nivåforandringer i Kristianiafeltet," *Norges Geologiske Undersøgelse, No. 31*, 1901, pp. 131-141. Compare this map with the Narvik sheet, which shows troughs and hanging valleys in more striking manner, and a less prominent terminal moraine dividing the two parts of Rombak Fiord. Some of the best photographs yet published of the fiorded coast of Norway may be found in a new quarto series entitled Grand Géographie Bong Illustrée, Paris, 1913. In Vol. 3, opposite p. 20, there is a striking photograph of Stavanger Fiord with its dark, lofty, stream-scored walls surmounted by the rolling upland that forms a large part of the surface of Norway. The colored views opposite p. 8, showing coastal scenery, are incomparable. See also the maps in this volume, pp. 6 and 7.—D. W. J.]



ASIA

TURKEY IN ASIA, ARABIA, CAUCASIA, IRAN

SCHWÖBEL, VALENTIN. **Die Landesnatur Palästinas.** (Series: Das Land der Bibel: Gemeinverständliche Hefte zur Palästinakunde im Auftrage des Deutschen Vereins zur Erforschung Palästinas herausgegeben von Professor Lic. Dr. G. Hölscher, Vol. 1, Nos. 1 and 3.) Part I: 56 pp.; Part II: 52 pp. J. C. Hinrichs'sche Buchhandlung, Leipzig, 1914. 9 x 6.

In about one hundred pages Dr. Schwöbel gives an admirable discussion of the physiographic features of Palestine. His work cannot be said to be original, but he has carefully studied the best authorities. He follows the usual method of discussing first the boundaries and general characteristics; then geological structure, climate, hydrography, surface forms, and altitude relations. For the most part he avoids theory and sticks to facts. In regard to the most warmly debated problem in the geography of Palestine, namely, changes of climate, he concludes that the hydrographic conditions have unquestionably changed during historic times, the supply of water being less now than 2,000 years ago. In explanation of this he offers the old hypothesis that subterranean sources of water supply have gradually become exhausted. People who have actually lived from season to season in dry countries are not likely to accept this idea. The volume of the springs changes so rapidly in response to seasons of drought or unusual rain that one can scarcely believe that huge reservoirs of water can have been gradually declining for hundreds of years. ELLSWORTH HUNTINGTON.

WILLIAMS, W. L. **Armenia, past and present: A study and a forecast.** With an introduction by T. P. O'Connor. xi and 211 pp.; maps, index. P. S. King & Son, Ltd., London, 1916. 3s. 6d. 7½ x 5.

To western peoples but vaguely acquainted with the past of the Near East, this glimpse of Armenia's tragic history will serve as an introduction. A preliminary sketch of the country, written concisely and not overburdened by technicality, leads the reader to graphic passages in the early period. Here as in the later and wider stream of national history, the author provides a mere historical outline; but he succeeds in giving a thoroughly intelligent first lesson. The relation of Armenia to the western world and the role of the inhabitants as early guardians of the more advanced ideals of the West are exhibited.

Concerning modern problems the author has culled from opinions freely aired in the press during the past thirty years, and makes no personal contribution. A partisan of Armenian autonomy, he realizes at the same time that the shifting of Near Eastern problems a few points to the east after the war may convert Asia Minor into a storm-center of the Balkan type. With a past and future clouded alike, the history of Armenia shows what a misfortune it was for its people to inhabit a highway of nations instead of a wayside path.

BLYTH, ESTELLE. **The future of Palestine.** *The Near East*, No. 293, Vol. 12, 1916, Dec. 15, pp. 157-158; No. 294, Dec. 22, pp. 181-182.

CALVERLEY, E. E. **The pearl fishing in the Persian Gulf, where the finest gems in the world are found.** Ills. *Scientific American Suppl.*, No. 2146, Vol. 83, 1917, Feb. 17, pp. 100-101.

CORSI, MARIO. **Il califfato turco in Asia e la rivolta delo sceriffo della Mecca.** *Riv. Coloniale*, Vol. 11, 1916, No. 7, pp. 341-349.

FALEV, P. A. **Compte-rendu d'une mission en Transcaucasie et en Azerbeïdžan pendant l'été 1916.** *Bull. de l'Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1917, No. 3, pp. 171-176. [In Russian.]

GHIBELLINO, D. O. **La Francia e l'Italia in Oriente e in Affrica: La questione dello Jemen.** *Riv. Coloniale*, Vol. 11, 1916, No. 10, pp. 580-587.

HILL, RICHARD. **In the cosmopolitan Caucasus.** Ills. *Travel*, Vol. 28, 1916, No. 2, pp. 26-30 and 46. ["A region that has harbored many nationalities since pre-Roman times—the valley of the seven nations and how the people live."]

JASTROW, MORRIS, JR. **The world's highway.** *The Nation*, No. 2670, Vol. 103, 1916, Aug. 31, pp. 197-200. [The historical struggle for the highway of Asia Minor and Mesopotamia.]

KHARAJIAN, H. A. **Regional geology and mining of Armenia.** 72 pp.; maps, diagrs., bibliogr. The Nerso Press, New York, 1915. 9 x 6.

PACE, BIAGIO. **Le due prime campagne della Missione archeologia italiana in**

Asia Minore. Maps, ills. *Boll. della Reale Soc. Geogr. Italiana*, Vol. 5, 1916, No. 11, pp. 885-907.

ROGERS, R. W. **A history of Babylonia and Assyria.** Vol. I: xx and 542 pp.; map, diagr., ills. Vol. II: xix and 609 pp.; ills., bibliogr., indexes. The Abingdon Press, New York, Cincinnati, 1915. 2 vols. $10.00. [A praiseworthy book of which the first volume deals with the history of archeological exploration, the geography of the Tigris-Euphrates region, and the modern development of knowledge of its ruins, mounds, and cuneiform records. The geographical sections are by way of explanation, but they are unusually clear and helpful. The constant contrast between the ancient and the modern geography of the Euphrates valley is scholarly in treatment and contributes much high-grade material to a regional study of the valley.

The second volume treats principally of dynasties, but is full of interesting matter concerning ancient colonists, nomads, plundering and military expeditions, and all the laborious but romantic wars between rival kingdoms through which was spread a knowledge of the arts and sciences of Assyria and Babylon.]

SOUTHARD, A. E. **Aden's trade in gums, spices, oils, and seeds.** *Commerce Repts.*, 1917, No. 24, pp. 376-379. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

THIMM, C. A. **Turkish self-taught, with English phonetic pronunciation.** (Marlborough's Self-Taught Series.) Revised by G. Hagopian. 138 pp.; ill. E. Marlborough & Co., London, 1910. 60 cents. 7½ x 5.

INDIA

JACK, J. C. **The economic life of a Bengal district: A study.** 158 pp.; diagrs. Clarendon Press, Oxford, 1916. 7s. 6d. 9 x 6.

This remarkable little book was written by a member of the Indian Civil Service who went home to take part in the war. While in India he had supervised one of the most careful economic studies ever made. With a corps of high-grade native assistants he made a detailed study of the income and expenditures of some 350,000 families in the Bengal district of Faridpur, in the delta of the Brahmaputra and Ganges. A million pages of data had been boiled down to a few tables, but the results had never been published. Fearing that his results might be lost to the world Mr. Jack took advantage of a furlough and in five days wrote this book. In it he not only gives a vivid description of a well-defined geographical province, but sheds a most illuminating light on Great Britain's wise colonial administration. Apparently his work had no immediate connection with the recent projects for increased customs duties on cotton in India, or for India's expenditure of half a million dollars for the world war; nevertheless it has a significant bearing on these questions.

Four-fifths of the two million people of Faridpur depend directly upon agriculture. Although the flat delta is inundated for months each year, population averages 900 per square mile. The southwestern part forms a shallow lake for eight months. Yet even there 800 people per square mile live on little islands which they themselves have heaped up. The period of steady farm work lasts only three months. The rest of the time, having harvested their rice and jute, the people have little to do except to fish. Sometimes the farmers of fairly prosperous districts hire those from less prosperous places to cut their rice crops for one-*sixth* of the product, while they themselves go to more favored places and work for one-*fifth* of the crop. The people are mild and quiet, as befits the climate, and Mr. Jack comments on the lack of laughter and of rough games among the boys. Litigation, however, is distressingly common, and lawyers profit outrageously.

For his economic discussion Mr. Jack divides the population into four classes whose numbers and weekly income per family are as follows:

(1)	Persons living in comfort (49%)	9s. 4d.	per week
(2)	" " below comfort (28%)	6s.	" "
(3)	" " above indigence (18½%)	4s. 3d.	" "
(4)	" " in indigence (4½%)	3s.	" "

Among the indigent there are practically none who suffer from hunger. Everyone can fish and the Bengalis are always ready to give food to the poor.

The most significant part of Mr. Jack's book is his discussion of indebtedness and especially taxation. Nearly half of the people are in debt, although most of the debts are small. The great difficulty is the enormous rate of interest, 30 or 40 per cent compounded semi-annually. Before the war in the more advanced countries of Europe the average revenue of the government from all sources ranged from $32 or $33 per head in England and France to about $18 in Italy, while in Japan it amounted to $8. In Farid-

pur it was only 90 cents per person. Nevertheless wages in every occupation in the country districts of Japan appear to be at a lower level than in Bengal. In southern Italy in the purely agricultural districts the income of the average peasant may be larger than that of the people of Faridpur, but it is nothing like twenty times as great, as it would have to be in proportion to the taxes. This leads to Mr. Jack's main conclusion. "Civilized government is not a cheap thing, and the recognized law is that the poorer the country the greater the cost of its government. India is an amazing exception. . . . . Bengal . . . . . is incontestably the most lightly taxed of civilized countries . . . . It is probable that there is no other in which the burden of taxation is not twice or three times as great as it is in Bengal." In return for this light taxation the Indian bureaucracy has supplied India with cheaper railway communication than any possessed by European countries, has provided for her the greatest irrigation works in the world, and has created a judicial system whose fairness and expedition are unsurpassed. It has maintained order and security of life and property in the most unlikely conditions, and has grappled successfully with widespread failure of crops, the most difficult problem which any government has ever been called upon to face. Of late years it has also attempted the stupendous labor of providing an ignorant and densely populated country with a modern system of education and sanitation. The only place where the Bengali gets little return for his taxes is in local affairs which he himself manages. Not only is education almost totally neglected, but health, water supply, roads, lighting, and the like are all very poorly managed, and a large part of the taxes is lost in the form of graft.

Mr. Jack's book is more forcible because he does not attempt to eulogize the British policy in India. He simply shows what it has done. Because he deals solely with facts his statements are convincing. If the people of India worked with a tithe of the energy and efficiency of their British rulers that country might be the richest in the world.

ELLSWORTH HUNTINGTON.

HOLDICH, T. H. **The survey link connecting the triangulations of India and Russia.** Ills. *Nature*, No. 2449, Vol. 98, 1916, Oct. 5, pp. 92-94.

—— **India, plague investigations in, Eighth report on.** Diagrs., ills. *Journ. of Hygiene: Plague Suppl. 3*, Vol. 13, 1914, pp. 403-681. Advisory Committee appointed by the Secretary of State for India, the Royal Society, and the Lister Inst., London.

—— **India and Russia, Completion of the link connecting the triangulations of, 1913.** vii and 121 pp.; maps, diagrs., ills., bibliogr., index. *Records of Survey of India*, Vol. 6. Dehra Dun, 1914.

KELWAY-BAMBER, H. **Thirty-five years' advance in Indian railway development.** Diagrs., ills. *Asiatic Rev.*, No. 26, Vol. 9, 1916, pp. 182-220.

KERSHAW, L. J. **Quinquennial review of forest administration in British India for the period 1909-10 to 1913-14 to which is appended the annual return of forest statistics for the year 1913-14.** 31 pp.; maps, diagrs. Dept. of Revenue and Agric., Simla, 1915.

—— **Meteorological observations taken in the laboratory of the Indian Association for the Cultivation of Science, 1914.** Diagrs. *Rept. of the Indian Assoc. for the Cultivation of Science for the Year 1914*, pp. 93-107. Calcutta, 1916.

RYDER, C. H. D. **Turco-Persian Frontier Commission.** Map, ills. *Records of Survey of India*, Vol. 9, pp. 164-173. Calcutta, 1916.

S——, ——. **India and German trade.** *Asiatic Rev.*, No. 28, Vol. 10, 1916, pp. 414-419; No. 29, Vol. 11, 1917, pp. 100-104.

TODD, J. A. **The world's cotton supply and India's share in it.** *Journ. Roy. Soc. of Arts*, No. 3345, Vol. 65, 1916, pp. 110-131 (discussion, pp. 126-131).

FARTHER INDIA, INCLUDING BURMA

CADET, G. LE. **Bulletin pluviometrique (1) 1914 and (2) 1915.** Maps. Observatoire Central de l'Indochine, Service Météorologique, Phu-Lien, 1915, 1916.

A prime source of meteorological material for the Indo-China region of southeastern Asia. Each volume has a few pages of well-conceived explanatory text, followed by tables and summaries, and a map showing the average yearly rainfall. Except for a belt of heavy rainfall on the eastern coast of the Gulf of Siam the regions of heavy precipitation conform to a notable degree with the topography. The most marked topographic elevation on the peninsula is a range of mountains that runs parallel to and very near the eastern coast. This, combined with a southeastern monsoon, results in a heavy rainfall all along the eastern coast except for a break that corresponds with the plains at Hanoi (lat. 20° N.).

BRENIER, HENRI. **Nos grandes colonies et la guerre: Indochine.** *Revue des Sci. Polit.*, Vol. 35, 1916, Apr. 15, pp. 145-171.

BRIGGS, L. P. **French Indo-China.** Ills. *Far Eastern Rev.*, Vol. 13, 1916, No. 1, pp. 32-34. Shanghai.

BRIGGS, L. P. **The production of palm sugar in Cambodia.** *Commerce Repts.*, 1916, No. 109, pp. 516-517. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

DURANDIN, PAUL. **Le pétrole dans l'Indochine française: Indices de l'existence de gisements d'hydrocarbures.** *Bull. du Comité des Trav. Hist. et Sci.: Sect. de Géogr.*, Vol. 29, 1914, pp. 40-79. Minist. de l'Instr. Publ. et des Beaux-Arts, Paris.

—— **French Indo-China, Mining in.** Ills. *Far Eastern Rev.*, Vol. 13, 1916, No. 2, pp. 68-69.

LEMOINE, PAUL. **Les travaux du Service Géologique de l'Indochine.** *La Géogr.*, Vol. 30, 1914-15, No. 4, pp. 288-290. Paris.

MAYBON, C. B. **Au sujet de la "Rivière du Tonkin."** Map. *Rev. de l'Hist. des Colonies Françaises*, Vol. 4, 1916, Part 3, pp. 257-266. Paris. [Discussion of the fluvial routes to Tonkin in the seventeenth century.]

REGELSPERGER, GUSTAVE. **L'Indochine actuelle, d'après l'"Atlas statistique" de M. Henri Brenier.** *Rev. Générale des Sciences*, Vol. 27, 1916, No. 6, pp. 178-189.

—— **Siam, Royal state railways of.** Map, ills. *Far Eastern Rev.*, Vol. 12, 1916, No. 9, pp. 365-368. [Director General Weiler's report for the year 2457, A. D. 1914-15.]

—— ***Anam: Fanrang Bay to Tonkin Gulf.*** 1:800,000. With inset: Entrance to Hue River. 1 in. to 1 mi. (1:70,000). *U. S. Hydrogr. Office Chart 3152.* Washington, D. C., 1916.

—— ***Indo-Chine, Carte de l'.*** 1:100,000. Six sheets: No. 177, ***Kompong-Thom***; No. 178, ***Porong***; No. 188, ***Kompong-Chlmang***; No. 198, ***Oudong***; No. 208, ***Pnom-Penh***; No. 284, ***Can-Tho*** (provisional edit., 1915). Service Géogr. de l'Indo-Chine, Hanoi, 1913.

—— ***Malacca, Strait of: Dinding Islands, The, and channels.*** 1:24,300. *U. S. Hydrogr. Office Chart No. 3738.* Washington, D. C., 1916.

—— ***Malakka Strait: Klang Strait and approaches.*** 1:50,000. *U. S. Hydrogr. Office Chart No. 3742.* Washington, D. C., 1916.

—— ***Siam, Gulf of: Fukwok Island and channels leading to the anchorages off Kampot.*** 1:150,000. *U. S. Hydrogr. Office Chart No. 3146.* Washington, D. C., 1916.

—— ***Siam, Gulf of: Kut Island to Riem Bay.*** 1:275,000. *U. S. Hydrogr. Office Chart No. 3138.* Washington, D. C., 1916.

—— ***Singapore to Kapas Island, Malay Peninsula—East Coast.*** 1:500,000. *U. S. Hydrogr. Office Chart No. 3131.* Washington, D. C., July, 1916.

OCEANS

—— **Atlantic and Indian Oceans, Monthly meteorological data for ten-degree squares in the, (1) January-June, 1914; (2) July-December, 1914; (3) January-June, 1915; (4) July-December, 1915.** 2 pp. each. *Kon. Nederl. Meteorol. Inst.* [*Publ.*] *No. 107*, Utrecht, 1915; 1916.

AULT, J. P. **Magnetic declinations and chart corrections observed on the Carnegie from Lyttelton, New Zealand, to South Georgia, and thence to Lyttelton and Pago Pago, December 1915-June 1916.** Map. *Terrestr. Magnet. and Atmosph. Electr.*, Vol. 21, 1916, No. 3, pp. 109-116.

AULT, J. P. **Magnetic declinations and chart corrections obtained by the Carnegie from Dutch Harbor, Alaska, to Lyttelton, New Zealand, August-November, 1915.** *Terrestr. Magnet. and Atmosph. Electr.*, Vol. 21, 1916, No. 1, pp. 15-18.

BABER, ZONIA. **The oceans, our future pastures.** *Scientific Monthly*, Vol. 3, 1916, No. 3, pp. 258-262. [Discusses the depletion of large sea animals and the desirability of international coöperation in enforcing remedial measures.]

BRUCE, W. S., ANDREW KING, AND D. W. WILTON. **The temperatures, specific gravities, and salinities of the Weddell Sea and of the North and South Atlantic Ocean.** *Trans. Roy. Soc. of Edinburgh*, Vol. 51, 1915, Part 1, No. 4, pp. 71-109.

BUEN, ODÓN DE. **Première campagne de l'Institut Espagnol d'Océanographie dans la Méditerranée.** 23 pp.; map. *Bull. l'Institut Océanographique No. 318.* Monaco, 1916.

BUEN, ODÓN DE. **Segunda campaña oceanográfica del "Vasco Núñez de Balboa."** *Bol. Real Soc. Geogr.*, Vol. 57, 1915, No. 4, pp. 515-526. Madrid.

CLARK, A. H. **On the temperature of the water below the 1000-fathom line between California and the Hawaiian Islands.** Diagr. *Journ. Washington Acad. of Sci.*, Vol. 6, 1916, No. 7, pp. 175-177.

GALLÉ, P. H. **On the relation between departures from the normal in the strength of the trade-winds of the Atlantic Ocean and those in the water-level and temperature in the northern European seas.** Diagrs. *Proc. Section of Sciences, Kon. Akad. van Wetenschappen te Amsterdam*, Vol. 17, Part 2, pp. 1147-1158. June, 1915.

JORDAN, W. L. **The "Challenger" records again, 1875-1915.** 8 pp. Simpkin, Marshall, Hamilton, Kent & Co., Ltd., London [1915]. 1s. 8½ x 5½.

MICHAEL, E. L. **Continuation of hydrographic, plankton, and dredging records of the Scripps Institution for Biological Research of the University of California (1913-1915).** Compiled and arranged under the supervision of W. E. Ritter. Diagrs., bibliogr. *Univ. of California Publs. in Zoology*, Vol. 15, 1916, No. 2, pp. 207-254.

HUMAN GEOGRAPHY

ANTHROPOGEOGRAPHY

FAIRGRIEVE, JAMES. **Geography and world power: A text-book of matriculation standard illustrating the geographic control of history.** x and 356 pp.; maps, index. Hodder & Stoughton, London, 1915. 3s.

The title might lend to the inference that the book was a product of the world war. As a matter of fact the manuscript was finished early in July, 1914, and was thereafter subject to a few verbal changes only. Nevertheless the interest of such a treatment is heightened in a time of almost universal struggle for mastery. The foreword is written by Professor Lyde, who says, "I cannot imagine anyone reading as far as Chapter II and not finishing the book."

The author's thesis, as developed in his introduction, is that human history is mainly a record of the use of energy, an energy which comes from the sun and is developed in forms of heat, winds, and rainfall, all having geographic distribution. The rest of the volume is made up of a series of fruitful and valuable regional chapters. Perhaps the chapter on Rome is as rich in suggestion as any. Italy is more a unit than Greece, but more diversified than Denmark or the Iberian Peninsula. Men from the mainland going south would cross the Etruscan Apennines in the vicinity of Bologna and Florence, and somewhere about Rome would meet foreign peoples that had come from lands beyond the Mediterranean. Among other things we have a statement of plausible geographic reasons why Rome rather than Egypt, Assyria, Phoenicia, or Greece first built great land roads.

The principle of economy in the use of power sometimes seems used in a rather artificial manner, tempting us to the old query as to our present competence for a fully systematic handling of this theme; but the volume is full of good inquiry and suggestions, and is a real contribution to a theme which is elusive and difficult, and must be so, because it involves scarcely less than a philosophy of history.

ALBERT PERRY BRIGHAM.

GEDDES, PATRICK. **Cities in evolution: An introduction to the town planning movement and to the study of civics.** xv and 409 pp.; maps, diagrs., ills., bibliogr., index. Williams & Norgate, London, 1915. 9 x 6.

A good book though somewhat difficult to review owing to the lack of close organization. Geddes has discovered some of the relations of cities to the density of population and develops the idea at length. He perceives the certainty of a Scandinavian renaissance when the "white coal" of its waterfalls drives the wheels of industry and the black coal of the present-day seats of industry is burning out.

A fine contribution is the contrast of *paleotechnic* and *neotechnic* industry, the one bent on making more money, the other bent on making better lives. He sets forth unsparingly the wretchedness pertaining to paleotechnic prosperity—"a vision for the most part of growing infinitudes of mean streets, mean houses, mean back-yards, relieved more or less by bigger ones, too often even duller still." Drunkenness is merely the shortest way out of the paleotechnic town! The neotechnic planner puts well-being above

wealth. There is much about housing and city planning in the book. Much credit is given the Germans for their notable contributions to the city plan, with the reservation that the masses are expected, in Germany, to keep on crowding into tenements.

Professor Geddes' work has consisted largely in advertising the need of town planning, and much space is given here to all methods of bringing it to the notice of the public. A good item is the succinct account of the Edinburgh "Outlook Tower," so long associated with the author's name. Typically cryptic is the note from the preface that "The City and Town Planning Exhibition [has met] total destruction by the vigilant and enterprising *Emden!*" Readers may do their own imagining.

MARK JEFFERSON.

CRILE, G. W. **Man—an adaptive mechanism.** xvi and 387 pp.; diagrs., ills., index. The Macmillan Co., New York, 1916. $2.50. 8½ x 6. [Chiefly physiological, but containing an introductory chapter of geographic interest entitled "Adaptation to Environment." Man is still "a changing, modifiable organism" and with changes in his environment have come changes in conditions governing the contest. "The enemy without the clan has been succeeded by the enemy *within* the clan . . . ."]

MOORE, G. H. **Population studies by Moore expectancy curve.** Diagr. *Engineering News*, Vol. 76, 1916, Nov. 2, No. 18, p. 844.

SPARROW, H. G. **Territorial waters.** *U. S. Naval Inst. Proc.*, No. 162, Vol. 42, 1916, pp. 447-460. [On the political status of territorial waters.]

WISSLER, CLARK. **"Men of the Old Stone Age"—A review.** Map, diagrs., ills. *Amer. Museum Journ.*, Vol. 16, 1916, No. 1, pp. 13-21. [Book by Henry Fairfield Osborn, reviewed in the August, 1916, *Review*, Vol. 2, p. 167.]

ECONOMIC GEOGRAPHY

Distribution

DAVIS, J. W., AND T. H. HUGHES. **Geography. Grade 8B. Commercial and political.** ix and 274 pp.; maps, ills. Hinds, Noble & Eldredge, New York, 1915. 8 x 6.

This text is one of a series that have been especially prepared to meet the requirements of the course of study in the schools of New York City. The point of view taken by the authors is that commercial interests should dominate the geography studies of the eighth grade.

The material of this book lacks the vigor that should be found in a text that is to serve as the climax to a grammar school course in geography. For example the meager treatment of the lumber industry, pp. 87-88, is too elementary for an eighth grade. An industry of this importance requires a more extensive discussion than is found in these two short paragraphs. Again, the choice and description of the physical regions in chapter IV are poor. It is a hasty review of the material that has already been carefully studied by pupils of the lower grades. The New England plateau is in the Atlantic Coastal Plain, Appalachian plateaus are represented only by the Alleghany. On the relief map, p. 36, names of the physical regions are used with no attempt to show their definite boundaries, which is a very essential element in industry or commerce. Cleveland, p. 121, does *not* make nearly all the steel vessels used in the lake trade.

The plan of this text is in accord with the present trend in school geography but its material lacks careful organization and the definite details that are necessary for the grammar school pupils if they are to study the geographic meaning of commerce and industry.

W. M. GREGORY.

HEIDERICH, FRANZ, AND ROBERT SIEGER, edits. **Karl Andree's Geographie des Welthandels, Vol. 3.** x and 572 pp., maps. Henrich Keller, Frankfurt, 1913. 12s. 10 x 7.

It is true that the geography of the German secondary schools as recently taught was patrocentric to a degree that surprised most outsiders. I have seen boys in their teens who would get their North America in a lesson and a half in a Leipzig gymnasium. This shows, however, that there is another side. It also shows by comparison the poverty of American minds in Anglo-Saxon geography, for we have not yet reached the point where we have an effective demand for such books. This Volume 3 covers Australia, New Zealand and Oceanica, and the Americas (Latin, "Germanic," and Polar). It has 572 pages. The ordinary page has 450 words, but many pages are in a smaller type that carries 600 words to the page; certainly there are over 250,000 words.

Teutonic systematization crops out in many forms, such as the thorough treatment of the Polar regions (31 pages) and in the old familiar Vereinigten Staaten von—

Venezuela in this case. It will doubtless recall to the minds of the onetime sojourners in the Fatherland the oft repeated question "Are you from the United States of North America or the United States of South America?"

The book is divided as follows: Australia and Oceanica, 86 pages; Latin America, 194, of which Argentina gets 13 pages; Central America 26; West Indies 27; Mexico 28. The "North American Union" gets 158 pages, and British America 80.

The method of treatment is the admirable one of giving as much as possible in general treatment before getting down to details, thus South America has 28 pages of general discussion and 114 pages devoted to particular countries. The discussion of the material on each country is topical. In the cases of the several countries of which I read I found the selection of material admirable and meaty, giving the facts necessary for a real economic interpretation, with an interesting collection of facts left over.

J. RUSSELL SMITH.

—— **Communication, the history of, or the evolution of communication.** 33 pp. New York Telephone Company. [Text of an illustrated stock lecture on the development of the telephone. A delivery in Brooklyn by Mr. S. V. Gibson was noted in the "Personal" column of the April, 1916, *Review*, Vol. 1, p. 308.]

JEFFERSON, MARK. **The range and township plan of roads.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 3, pp. 80-81.

JOHNSON, E. R. **Probable changes in the foreign trade of the United States resulting from the European War.** *Amer. Econ. Rev. Suppl.*, Vol. 6, 1916, No. 1, pp. 17-24. [Paper read at the 28th Annual Meeting of the Amer. Econ. Assoc., Washington, D. C., Dec., 1915.]

—— **Ships, The unprecedented demand for.** Ills. *Dun's Rev.: Internatl. Edit.*, Vol. 27, 1917, No. 5, pp. 46-51. [With good photographs.]

WILLIAMS, S. M. **Roads—their influence upon economic and social conditions.** 16 pp.; diagr., ills. Garford Motor Truck Co., Lima, Ohio, 1916. 9 x 6.

HISTORY OF GEOGRAPHY AND EXPLORATION

GWATKIN, H. M., AND J. P. WHITNEY, edits. **The Cambridge Medieval History. Vol. 1: The Christian Roman Empire and the foundation of the Teutonic Kingdoms.** xxi and 754 pp.; maps, index. **Vol. 2: The rise of the Saracens and the foundation of the Western Empire.** xxiv and 891 pp.; maps, index. The Macmillan Co., New York, 1913. $5. 9½ x 7.

These later students in Gibbon's field have corrected his errors of interpretation, have had access to material which was not within his reach, have been trained in a school of the interpretation of historical documents of which he was the founder. But we must admire the more the depth of his research and the genius with which he presented the story of the decadent empire and the vigor of the barbarian people founding a new state upon ruins. The first volume of this new history is a monument to Gibbon. The second brings us to the reign of Charlemagne and the creation of the Holy Roman Empire, the vigorous empire of the Franks and therefore of folk with whom our kinship is a matter now of sentiment rather than of an intellectual comprehension of the Indo-Germanic community of origin.

WILLIAM CHURCHILL.

LAVEILLE, E. **The life of Father de Smet, S. J. (1801-1873).** Authorized translation by Marian Lindsay. Introduction by Charles Coppens. xxii and 400 pp.; ills., index. P. J. Kenedy & Sons, New York, 1915. $2.75. 9 x 6.

Father de Smet is the "Marquette" of the Indians of the Great Northwest. He was a mission builder, a traveler, a lover of the Indian and his ways, and always a champion of the red man in his grievances against the whites. His missionary labors began at Florissant near St. Louis in 1823. In 1838 he established a mission among the Potawatomies, then in eastern Kansas. In 1841 he settled the Blackfeet Indians about a mission near Missoula, Montana, and in 1844 opened a mission on the Willamette River. His journeys in North America took him from Baltimore to the mouth of the Columbia and northward to the Hudson's Bay Company's post at Fort Edmonton. In the Indian wars that followed the great "white conquest" that dispossessed the Indian of his lands, Father de Smet was invaluable on many occasions in bringing peace between the whites and the enraged and desperate Indians. His work among the Indians was constructive. Through his efforts civilization marched hand and hand with the Faith, for he taught the red men to till the soil and thus prepare themselves for the advanced economic life that would surely follow the encroachment of the whites.

The work is based primarily on the letters and documents of Father de Smet. The author had a wealth of original material at hand. Throughout there are frequent quotations from Father de Smet's letters. One gets an idea of the difficulties of travel in frontier days in the Northwest, though in this respect the book presents nothing that is new. Like the Jesuits of the Great Lakes, Father de Smet was a student of Nature and made collections of plants, insects, and minerals, but nothing of this valuable work appears in the book. In this respect the book is far inferior to the admirable Jesuit Relations and to the original published letters of Father de Smet (see "Life, Letters, and Travels of Father de Smet," edited by H. M. Chittenden and A. T. Richardson, New York, 1904). Moreover, the author may be accused, with all fairness, of being prejudiced in his interpretation of many historical facts. His opinion of the labors of the Protestant missionaries in the Northwest is unworthy to say the least. His discussion of the dealings of the United States government with the Indians and of the developments of the Grant peace policy is wholly one-sided. One does get, however, the story of the struggle of the Indians against the ruthless advance of the white from the Indian point of view.

A. E. PARKINS.

NORTHUP, G. T., edit. and transl. **Amerigo Vespucci letter to Piero Soderini, Gonfaloniere. The year 1504.** 116 pp.; diagr. **Mundus Novus letter to Lorenzo Pietro di Medici.** 13 pp.; diagr. (Vespucci Reprints, Texts and Studies, IV and V.) Princeton University Press, Princeton, and Humphrey Milford, Oxford University Press, 1916. $1.25 and 75 cents. 8½ x 6.

Few topics relating to the first discoveries in South and Central America present greater perplexities than the four voyages described in the celebrated letters of Amerigo Vespucci. Some investigators regard them as apocryphal, others as genuine, but mendacious, others as genuine and truthful. The discrepancy existing among the different savants is, one might say, disconcerting. (See e. g., "Americus Vespucci, Leben," etc. Hamburg and Leipzig, 1748; Vizconde de Santarem "Carta del Excmo. Sr. . . . . ., archivero mayor del Reyno de Portugal, sobre los viajes que Vespucio," etc., in "Colección de Documentos Inéditos," Vol. 39, Madrid, 1883; "Researches respecting Americus Vespucius, and his Voyages," translated by E. V. Childe, Boston, 1850; and Henri Vignaud, in *Journal de la Société des Américanistes de Paris*, Vol. 8, 1911.)

Above all, it is necessary here to remember that the Vespucci letters constitute up to this very moment the only source of information we possess as to several voyages and exploring expeditions accomplished between the years 1499 and 1503 by the Spaniards and by the Portuguese in the New World. The so-called *first* voyage, said to have been carried out between 1497 and 1498, we will dismiss from this brief abstract and, leaving that complicated question to be treated in a special paper, state merely incidentally, that it is nothing else than the voyage undertaken in 1499 by Alonso de Hojeda, who then was acting upon letters patent granted to him by the sovereigns of Castile.

Reverting to the Vespucci letters, it is not less important to remark that the writings of the Florentine concerning the newly-discovered countries beyond the ocean and referring to the exotic people he had therein encountered, were during many years the favorite literature of intellectual Europe. The letters were soon translated into most cultural languages, thus circulating widely the whole continent over. Between 1504 and 1505 eleven editions had successively appeared of the Medici Letter, or "Mundus Novus." These editions as well as many other Latin and Italian editions were again and again re-translated and reprinted. Hence we know more than thirty editions in Latin, in Italian, in German, and one even in Dutch (only copy said to be extant is in the John Carter Brown Library, Providence, R. I.), printed between 1504 and 1509. Those prints, and many others akin, now bibliographical curiosities, were but mere "broadsides," which had been issued and circulated with the unmistakable purpose of keeping informed the general public of important and at once interesting events that now and then had happened abroad. They were commonly in 8vo, or in small 4to, now with numbered pages or folios, now simply bearing signatures in the right or in the left corner below, on the recto of the folio, often without colophon and without mark of the printer, nor water mark in the paper, a circumstance that of course hinders bibliographical investigation; some of them adorned with wood-cuts copied from originals inserted in similar prints, as e. g. Columbus letters, and so forth.

Furthermore, being "sensational literature," and having been destined, as it seems, for mere commercial purposes, the different translations and editions had suffered at the hands of translators and even of editors and printers. Vespucci's heavy style and somewhat confused diction intermixed with a strange terminology, "barbarisms," of course led to all kinds of speculations. Omissions, additions, interpolations, misreadings, and the subsequent mistakes and erroneous interpretations, even entirely false translations, and so on, occur in most editions. There can be no doubt that the texts on which the

modern historian generally bases his judgments, as Mr. Northrup very correctly remarks, "are vastly different from those which left the author's hand" (p. 1). He adds: "The extant versions of these must be critically examined, collated and classified; critical texts must be established before historians can hope to form accurate judgments based upon Vespucci's writings." Thus the critical study of the Soderini letter, "treated solely in its philological aspects," constitutes the scope of the important investigation published by Princeton University.

This premised, the author dedicates over forty pages to a detailed and most conscientious investigation as to the "Quellenverhältnis" of the Florentine print (1504), the Magliabechiana manuscript and the Hylacomylus version. According to Mr. Northup, the Italian versions can be traced back to a Spanish original; and the Hylacomylus edition goes back to an Italian original through some French(?) version. To sum up, he amply proved what the compiler of the "Paesi nuovamente retrouate" had explicitly observed in 1507: "... fo de lengua spagnola interpretato in idioma romano." More or less the same statement the student may read in the colophon of certain editions of the Vespucci letters, printed between 1505 and 1506 at Augsburg (?).

Though it is far from our mind to minimize the all-important investigation of Mr. Northup, we ought nevertheless to observe that the Venetian ambassador Angelo Trevisan di Bernardjno sent to Venice only Peter Martyr's *First Decade*, which in 1504 was issued under the title of "Libretto de tutta la navigatione de re de Spagna," etc. Perhaps it might have been useful to glance over the Vespucci manuscript of the Biblioteca Nazionale at Florence, as published by Guglielmo Berchet ("Raccolta Colombiana," Part III, Vol. 2, Rome, 1893, pp. 136-170), in which is also to be found the letter of Vespucci addressed to Laurentius Petrus Franciscus de Medicis (pp. 123-135).

RUDOLPH SCHULLER.

—— **Addresses at memorial services in honor of Dr. E. W. Hilgard, University of California, January 30, 1916.** 50 pp.; ills., bibliogr. Reprinted from the *Univ. of California Chronicle*, Vol. 18, 1916, No. 2, Berkeley. [Compare the sketch "The Geographical Work of Dr. E. W. Hilgard" by R. M. Harper in the *Geogr. Rev.*, Vol. 1, 1916, pp. 368-370.]

ALVORD, C. W. **A critical analysis of the work of Reuben Gold Thwaites.** *Proc. Mississippi Valley Hist. Assoc. for the Year 1913-14*, Vol. 7, pp. 321-333.

B——, A. C. **Sir Clements R. Markham.** *Science*, Vol. 43, 1916, Apr. 21, pp. 559-562. [Obituary.]

BABCOCK, W. H. **The so-called mythical islands of the Atlantic in mediæval maps.** (Considered as evidence of pre-Columbian exploration toward America.) Maps, bibliogr. *Scottish Geogr. Mag.*, Vol. 31, 1915, No. 5, pp. 261-269; No. 6, pp. 315-320; No. 7, pp. 360-371; No. 8, pp. 411-422; No. 10, pp. 531-541; Vol. 32, 1916, No. 2, pp. 73-79; No. 3, pp. 131-140.

BAIN, H. F. **N. H. Winchell and the "American Geologist."** Ills. *Economic Geol.*, Vol. 11, 1916, No. 1, pp. 51-62. [Interesting account of the development of geology in this country since 1888, which provides a hopeful analogy for geography.]

BEJARANO, M. M. **Bio-bibliografía hispálica de Ultramar: Estudio de literatura geográfica española.** Bibliogr. *Bol. Real Soc. Geogr.*, Vol. 57, 1915, No. 4, pp. 401-451; Vol. 58, 1916, No. 1, pp. 90-128; No. 2, pp. 221-256; No. 3, pp. 345-400; No. 4, pp. 413-447. Madrid. [The exceptionally favorable location of Seville enabled this city to contribute largely to the history of colonial Spain. The article noted is a biography—with bibliography—of writers, natives of the city and its environs, who have contributed to our knowledge of "The Indies."]

BRADLEY, C. B. **A reference list to John Muir's newspaper articles.** *Sierra Club Bull.*, Vol. 10, 1916, No. 1, pp. 55-59.

BRANNER, J. C. **Orville A. Derby.** *Journ. of Geol.*, Vol. 24, 1916, No. 3, pp. 209-214.

DODGE, G. M. **James Bridger.** Ill. *Mag. of Hist. with Notes and Queries*, Vol. 21, 1915, No. 1, pp. 1-24. [This frontiersman's name is associated with the development of the overland routes. His discovery of South Pass in 1827 indicated a feasible route across the Rockies in this region, a route later followed by the California and Oregon trail. In 1843 he founded Fort Bridger.]

DORAN, J. E. **A bibliography of John Muir.** *Sierra Club Bull.*, Vol. 10, 1916, No. 1, pp. 41-55.

ENGELN, O. D. VON. **Shakespeare, the observer of nature.** *Scientific Monthly*, Vol. 2, 1916, No. 6, pp. 573-588.